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ABSTRACT

As one in a series of test item collections developed by the Assessment and Evaluation Unit of the Directorate of Studies, items are made available to teachers for the construction of unit tests or term examinations or as a basis for class discussion. Each collection was reviewed for content validity and reliability. The test items meet syllabus content and aims best suited to multiple choice questions, but teachers are meant to base the use of the test items on student ability and the particular program objectives in grades 7 through 10. Test items related to the knowledge and application of information in biology are presented in sections on structural and process aspects of body systems, health and foods. There is also a section on plants. Test items on reproduction, genetics, classification, ecology adaptations and evolution complete the volume. There are 479 test items. Answers are provided with each item; drawings, tables and diagrams illustrate many questions. (CM)

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SCIENCE

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A COLLECTION OF MULTIPLE CHOICE TEST ITEMS RELATING MAINLY TO

BIOLOGY

TM 820 316

VOLUME SEVENTEEN OF THE SCIENCE LIBRARY OF TEST ITEMS

ISBN - 0 - 7240 - 5321 - 4

VOLUME SEVENTEEN OF THE
SCIENCE LIBRARY OF TEST ITEMS

BIOLOGY

Also in this series....

Volume 18	CHEMISTRY
Volume 19	GEOLOGY
Volume 20	PHYSICS (1)
Volume 21	PHYSICS (2)
Volume 22	SKILLS

Produced by the
School Certificate Development Unit
Directorate of Studies
Department of Education
New South Wales

Introduction

During the development of the Science Library of Knowledge Items it was planned to publish them as a new volume in the bank of Test Items.

We reached that stage in the development of these items and found that the situation had slightly changed. Many teachers were writing to us requesting replacement copies of Volumes 1 and 2 of the Library of Test Items. These were both out of stock and a reprint seemed essential.

Then we had a bright idea - instead of a reprint, collate the entire collection (to date) into a new set of books where all questions relating to broad topic areas were grouped together.

This is the first of such a series - a collection of Test Items relating mainly to Biological topics. More will follow as soon as final editing of the material can be done.

This volume includes:

(i) all the multiple choice test items related to a knowledge or application of Biological facts from Volumes 1 and 2.

(ii) new test items originally destined for the knowledge collection "Volume 3", or which are Biology oriented.

Additional format changes are:

(a) *no index is included.* Feedback suggested that this was cumbersome and not often used. Instead a contents list has been included to indicate groups of questions.

(b) The book has been printed to allow its storage in a loose-leaf system. This is to allow the inter-leafing of more test items on each topic as they become available. In this way, items can be kept together in the future instead of appearing in several books.

If you have any comments, criticisms or suggestions they will be welcomed by:

The Subject Officer (Science),
School Certificate Development Unit,
Directorate of Studies,
G.P.O. Box 33,
SYDNEY. 2001.

Acknowledgements

Many teachers have been involved in developing the library of test items. As with any list of credits, there will always be some who are inadvertently overlooked. To these we extend our apologies.

Those who appear in our files, in alphabetical order, appear in the list below. To these, our thanks and appreciation for work done and the hope that we will continue to receive your support in the future:

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Peter SWAN	Macintyre High School
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Jc WESSEN	Granville High School
J.F. WHEELDON	Wagga Wagga High School

And a special thanks to the girls at S.C.D.U. who have typed without (audible) complaint as we have constantly changed question after question.

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Brian SHADWICK
Jim STAMELL

DEVELOPMENT OF THE LIBRARY

This collection of material is intended as a resource to assist teachers to implement and evaluate courses in the first four years of secondary school.

Because the questions were submitted by classroom teachers from both Government and non-Government schools in all parts of the State, they constitute a cross-section of the ideas which currently pervade classroom practice.

To ensure quality in the collection, only those items which satisfied several quality control checks have been included. Foremost among these were:

(i) inspection by a panel of experienced, practising teachers;

(ii) a pretest with a representative selection of Years 7-10 students.

As well as sharing in the general editing and reviewing functions, the review panels checked each item for *content validity*. The pretest was used to establish the *efficiency* of the items as measuring instruments. Three of the major statistical criteria used were:

(i) Item Facility: The facility index measures the proportion of the sample candidature who answered the question correctly. All items in this collection have a facility index between 0.30 and 0.90.

(ii) Item Discrimination: This index measures the degree to which success on the item is correlated with success on the total test of which the item is a part. A commonly used index of discrimination is the point-biserial correlation coefficient. Every item in this collection attained a point-biserial correlation coefficient of at least 0.20. This means that on the pretest, each item added significantly to the total score of information about the relative achievement of the candidature.

(iii) Distractor Efficiency: With each item, each distractor was chosen by at least 5% of the total candidature, except in the case of very easy items, where an even spread of respondents was sought.

For the test to be *reliable*, many features apart from these three must be considered. However, the proven quality of these items, as measured by these three criteria, makes it highly likely that any test chosen from this collection, and administered to *appropriate* classes, will be a more reliable instrument than teachers could normally produce without this assistance.

USING THE COLLECTION

Items in this collection may be reproduced for classroom use in any form desired by the teacher. To facilitate the preparation of printing masters particular attention has been given to both the diagrams and the layout of the items.

To assist the teacher, the items have been classified according to the content being tested and two pieces of information are provided:

(i) the key (or correct option), and;

(ii) the difficulty rating (1-5), which is based on the data obtained during the pre-testing program. A question rated "1" was correctly answered by some 30-40% of students, while "5" indicates a correct response by 80-90% of students in the pre-test sample. Recent investigations have shown that while this information is useful as a general guide, item difficulties vary greatly when items are given to classes who have recently studied the material covered in given items. The ratings should not be confused with norms or goals: they are merely useful guidelines for teachers.

It is suggested that items might be used for the following purposes:

1. As a source of items for short unit tests.
2. As a source of items for term tests.
3. As a source of ideas for in-school item construction.
4. As a basis for class discussions (it should be noted that stimulus material was NOT designed for use with the overhead projector. The letter size used in typing items would not be legible at more than 4 metres from the screen in an average classroom).

One important warning should be given to all teachers using this collection. Some areas of syllabus content and some syllabus aims are better suited to testing with multiple choice items than others. Consequently, this collection is unlikely to be balanced in its coverage. In addition, the inclusion of an item is not intended to imply that a particular piece of content or teaching strategy has a place in the curriculum. The final selection must lie with the teacher in the classroom who knows the interests and abilities of his students.

Comments, criticisms and suggestions from teachers are welcome. All correspondence should be addressed to :

The Subject Officer (Science),
Directorate of Studies,
Box 33 G.P.O.,
SYDNEY. 2001.

CONTENTS

This list of contents gives broad topic headings only. The headings were selected by a group of experienced science teachers in an attempt to provide quick access to the library of test items.

The topics are not totally definitive and overlap will obviously occur. There will also be occasions where teachers disagree with the groupings. This is inevitable and unavoidable.

Effective access to questions will be enhanced by familiarity with the collection as a whole and the loose leaf nature of the book will enable teachers to make their own groupings if they so desire.

Such a grouping of questions has indicated areas of the item bank which need further development and future publications will work towards these areas.

It is hoped however, that the collation of Biology items into a single volume will make the items more accessible and more often used.

CELLS, types, functions ____ 7
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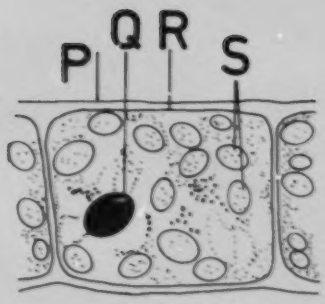
CELLS

A student observed a cell of an alga under a microscope. He made the following notes.

"It has a rigid cell wall with a cell membrane inside the wall. There is a large round structure called a nucleus in the cell. There are also several small green structures in the cell."



He drew the diagram on the right but forgot to label the cell.

What are the correct names for the labels (P), (Q), (R), and (S) in that order?

A. Nucleus, cell wall, cell membrane, chloroplasts.
B. Cell wall, nucleus, cell membrane, chloroplasts.
C. Cell wall, cell membrane, nucleus, chloroplasts.
D. Chloroplasts, cell membrane, cell wall, nuclei.

B5. 1

Imagine you have just compared a sample of the cells in a mouse and an elephant. You would expect to find that the mouse, compared with the elephant, had

A. fewer cells, but they were larger.
B. fewer cells, about the same size.
C. fewer cells, and they were smaller.
D. the same number of cells, but smaller.

B1. 2

The next question refers to this quotation.

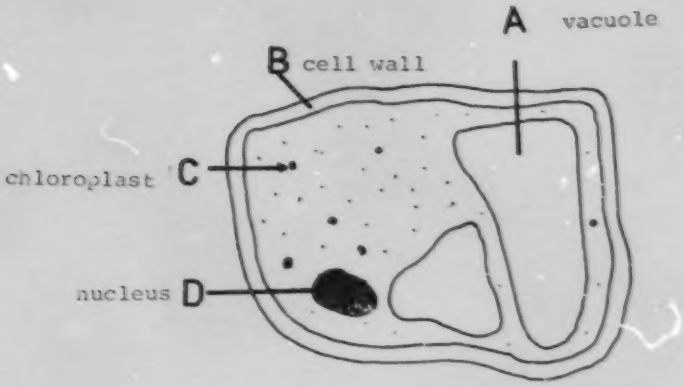
"They are microscopic. They all arose from a fertilised egg. They are found in all humans. They are found throughout the body."

19. "They" are

A. cells.
B. bones.
C. arteries and veins.
D. vitamins.

A5. 3

The next question refers to this diagram.



The diagram represents a simple plant cell. Which part of this cell A, B, C or D is most likely to control all the cell functions.

D4

4

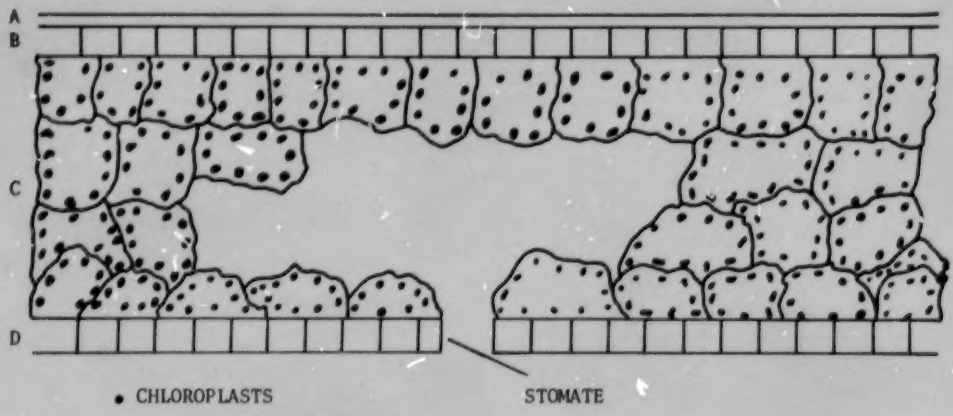
The next question refers to the table shown below.

The table shows the structure of four cells

CELL A	CELL B	CELL C	CELL D
Cell membrane	Cell wall	Cell wall	Cell wall
Nucleus with chromosomes	Nucleus with chromosomes	No nucleus	Nucleus with no chromosomes
No vacuoles	Vacuoles	Vacuoles	No vacuoles
Chloroplasts	Chloroplasts	Chloroplasts	No chloroplasts

B3 Which cell is most likely to be a plant cell?

5



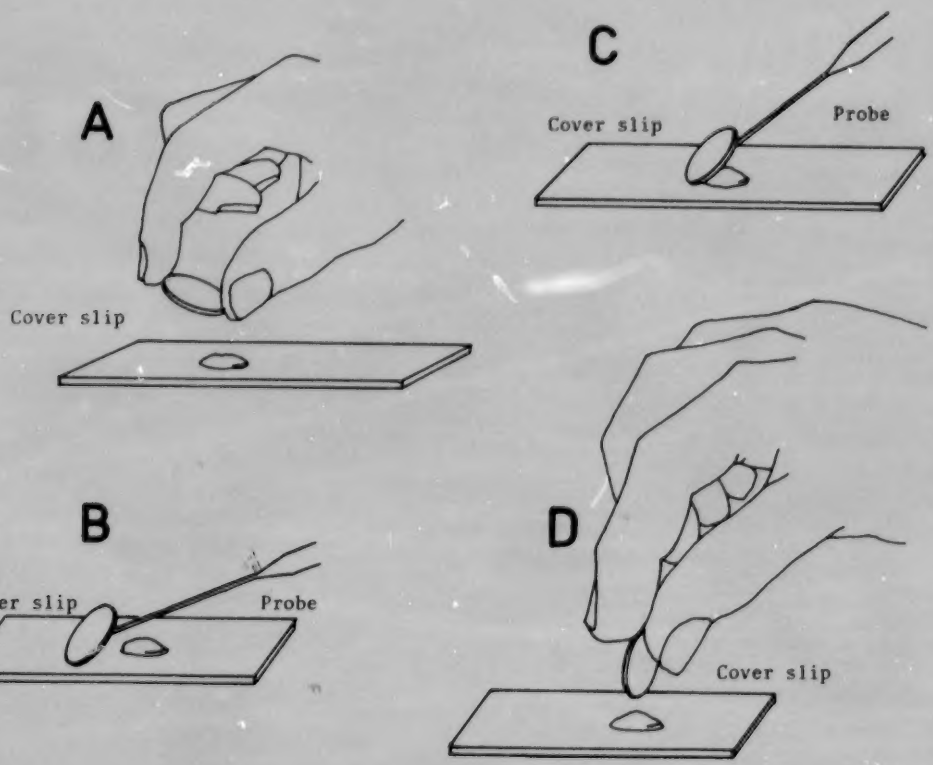
Photosynthesis is most likely to occur in the cells found in layer

A. A.
B. B.
C. C.
D. D.

C.4

6

Which of the following diagrams shows the correct method for putting a cover slip on a microscope slide?



C3.

7

Xylem and phloem are cells which

A. absorb solutions in plants.
B. transport solutions in plants.
C. store food.
D. carry out photosynthesis.

8

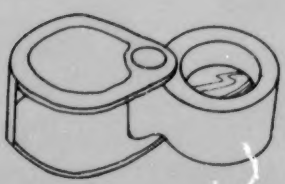
The following procedures are concerned with examination of living plant cells from the epidermis of an onion. The procedure you should NOT use is

A. stain the cells with iodine.
B. examine the cells first on high power and then on low power.
C. cover the wet specimen with a cover slip.
D. use a section which is only several cells thick.

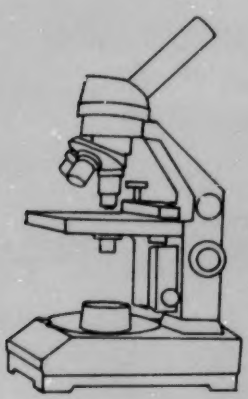
9

Which of the instruments below would be the most suitable to give a magnification of 30x to examine small insects?

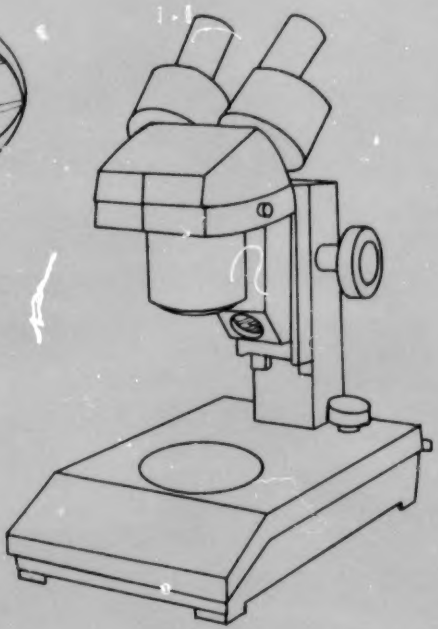
A.



B.



C.



D.

10

The order of cells in the diagrams below from 1 to 4 is

	1	2	3	4
A.	animal cell	nerve cell	blood cell	muscle cell
B.	plant cell	root hair cell	cheek cell	conducting plant cell
C.	plant cell	muscle cell	stomatal cells	nerve cell
D.	stomatal cells	blood cell	bone cell	cheek cell

C4 11

Muscle cells differ from most other body cells by

A. being able to contract along their length.
B. being able to make their own food for energy.
C. reacting voluntarily without the need of a nervous impulse.
D. having no cell membrane or nucleus.

A4 12

The process by which water molecules pass through a semi-permeable membrane from low to high concentration of a solute is called

A. Brownian movement.
B. diffusion.
C. osmosis.
D. Bernoulli effect.

C3 13

The cytoplasm of a plant cell will become most reduced in volume by osmosis if the cell is placed in

A. tap water.
B. distilled water.
C. dilute sugar solution.
D. concentrated salt solution.

D2 14

If you placed a potato in a very concentrated solution of common salt in water and left it for several hours you would expect the potato to

A. shrink or shrivel because it loses water.
B. swell because it absorbs water.
C. swell because it absorbs air dissolved in the solution.
D. turn blue-black because it contains starch.

A1 15

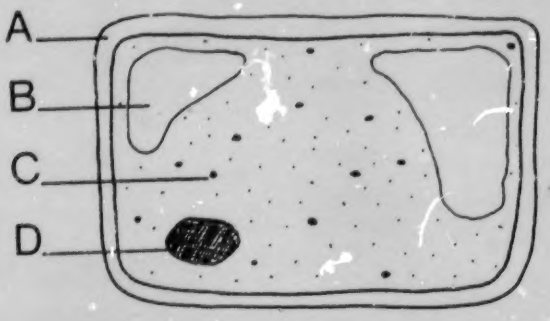
A student is preparing cheek cells in order to look at them under a microscope. She places the cheek cells on a clean microscope slide with a drop of water and a drop of iodine solution. She uses the iodine solution because it

A. disinfects the cheek cells.
B. stains the cells so that they can be seen more clearly.
C. slows down the movement of the cells.
B4 D. causes starch to turn blue-black. 16

Cells would not be found in

A. bone
B. blood.
C. a piece of wood.
D1 D. a salt crystal. 17

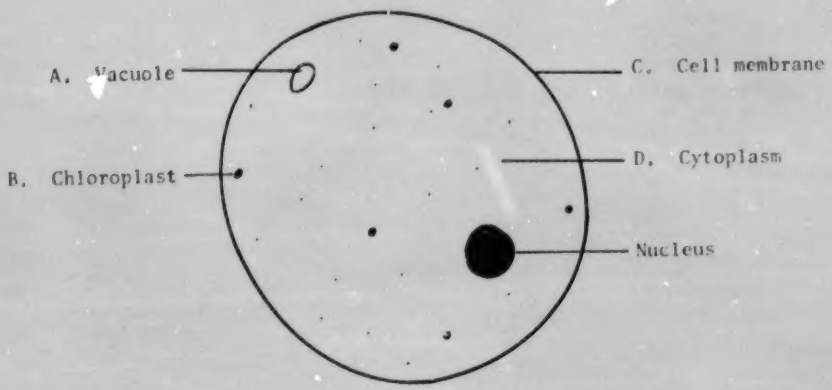
The next question refers to this diagram.



The diagram represents a simple plant cell. Which part of the cell could best be labelled "Vacuole"?

B3. 18

The next question refers to this diagram of an animal cell.



Which label A, B, C or D is INCORRECT?

B2. 19

The control centre in humans is the brain. The cell's control centre is

A. the cell membrane.
B. the cytoplasm.
C. the nucleus.
D. the vacuole.

C4 20

Animal cells always have

A. protoplasm and cellulose cell walls.
B. vacuoles and chloroplasts.
C. protoplasm and living cell membrane.
D. cytoplasm, vacuoles and cell wall.

C3 21

Which of the following is not usually found in an animal cell?

A. Chloroplast.
B. Cytoplasm.
C. Nucleus.
D. Ribosome.

A3 22

The vacuole of a typical plant cell is used to

A. control respiration.
B. control growth and reproduction.
C. store oxygen.
D. store food.

D2 23

All cells

A. vary in shape and size according to the shape and size of the living thing.
B. vary in shape and size according to their function.
C. have the same shape and size.
D. change their shape continuously.

B3 24

The following is a list of four human cell types.

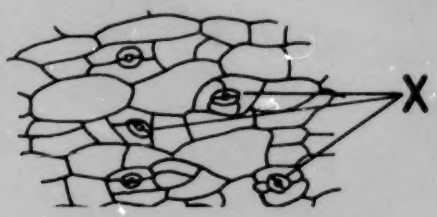
P. Red blood cell.
Q. Sperm cell.
R. Cell from the surface of the skin.
S. White blood cell.

In which of the following pairs of the above cell types are both members capable of independent movement?

A. P and Q.
B. P and R.
C. R and S.
D. Q and S.

D.1 25

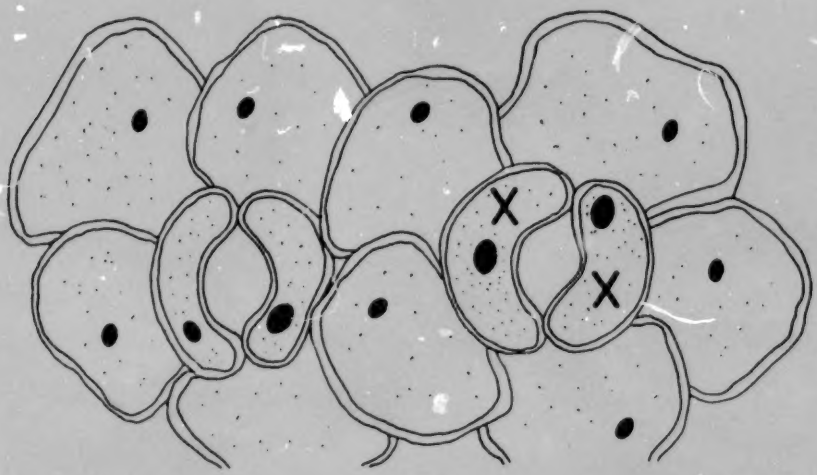
The next question refers to the following diagram.



What goes into a plant through structures like X?

A. air.
B. food.
C. minerals.
D. water.

A3 26



The most important <u>function</u> of the cells labelled "X" in the diagram above is

A. to photosynthesise raw materials into glucose and oxygen.
B. to store starch until it is required by the plant.
C. to control the loss of water from the leaves.
D. to control the uptake of minerals into the plant.

C2 27

Same as Q23 P14)

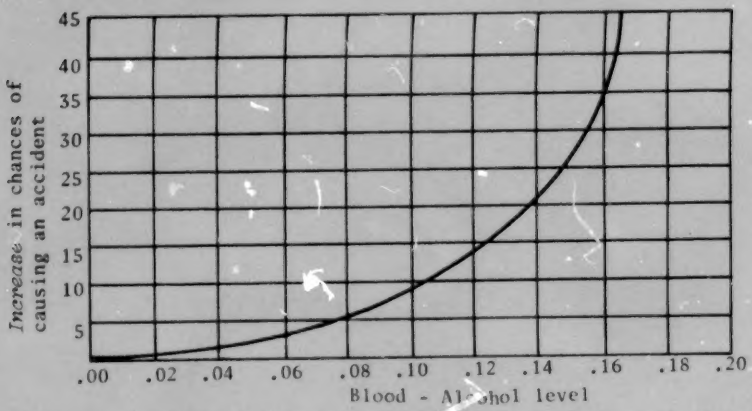
The vacuole of a typical plant cell is used to

A. control respiration.
B. control growth and reproduction.
C. store oxygen.
D. store food.

D2 28

CIRCULATION

The next question refers to this graph.



This graph shows how the amount of alcohol in a driver's blood affects his chance of having an accident.

What is the blood alcohol level of a driver who is ten times more likely to cause an accident than a driver who has no alcohol in his blood?

A. .09% B. .11% C. .12% D. 11%

B3 29

Which of the following gases is present in the same proportion in exhaled and inhaled air?

A. Carbon dioxide. C. Oxygen.
B3 B. Nitrogen. D. Water vapour. 30

Which of the following substances is absorbed by the red blood cells?

A. Carbon dioxide. C. Oxygen.
C3 B. Iron. D. Water. 31

If one compares the artery leading to a particular body organ with the vein that receives the blood from that organ, then the

A. artery will have a larger bore, and thicker walls than the vein.
B. artery will have a smaller bore, and thicker walls than the vein.
C. vein will have a larger bore, and thicker walls than the artery.
B1 D. vein will have a smaller bore, and thinner walls than the artery. 32

Which of the following causes blood to clot?

A. haemoglobin. C. platelets.
C2 B. plasma. D. red blood cells. 33

When we are hot, our skin becomes pinker. This is related to the fact that

A. blood flows more rapidly when we are hot.
B. hot things become red.
C. more blood is flowing close to the skin.
C2 D. the body is producing more blood. 34

The next question refers to the cartoon below.

The little boy in this cartoon

A. should go to the top of the class.
B. has a rare blood disease.
C. is making up stories to tell his mother.
D5 D. has type A blood. 35

The human body is made up of millions of small units known as cells. The diagram below represents a section through one such cell

This cell is most likely to be a

A. cheek cell. C. nerve cell.
D3 B. muscle cell. D. red blood cell. 36

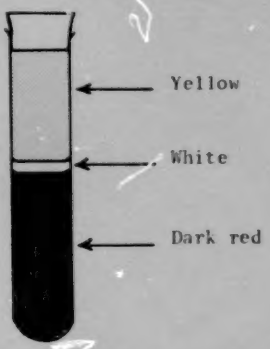
Respiration in animals occurs

A. on the internal surface of the lungs.
B. in the blood only.
C. through the external surface of the body.
D. in every living cell.

D.3 37

A sample of blood is shown in a test tube.

This was then placed in a centrifuge for a period of time. After centrifuging it looks like this:



From this observation it follows that blood is

A. a pure substance.
B. a mixture.
C. decomposed by centrifuging.
D. killed by centrifuging.

B4. 38

If you have an accident and cut some blood vessels, it is far more serious to cut an artery than to cut a vein. This is because compared with blood in veins, the blood in arteries -

A. contains more food and oxygen
B. is under greater pressure
C. contains more white cells and antibodies
D. is free of wastes and carbon dioxide.

B3. 39

The structures that carry blood away from the heart to the body are called

A. arteries.
B. capillaries.
C. valves.
D. veins.

A4 40

Haemorrhage is the term used to describe loss of blood from the body.

The immediate effect of a severe haemorrhage in man is

A. a decrease in arterial blood pressure.
B. an increase in arterial blood pressure.
C. an increase in the rate of arterial blood flow.
D. a change in the proportion of salts in the blood.

A.2 41

William Harvey is well known as the discoverer of the circulation of blood. After many observations he wrote the following:

> "The heart appears to be a hollow muscle(1), when the muscle acts the space inside gets smaller and squeezes out the blood(2). That is why it becomes pale(3). When the muscle relaxes, blood flows into the larger cavity and the heart gets redder(4). The heart is therefore a pump(5).

The statements which you regard as conclusions that William Harvey has made are

A. 1, 2 and 4.
B. 3 and 5.
C. 4 and 5.
D. 1, 2 and 3.

B.1 42

(Same as Q25 p14)

The following is a list of four human cell types.

P. Red blood cell.
Q. Sperm cell.
R. Cell from the surface of the skin.
S. White blood cell.

In which of the following pairs of the above cell types are both members capable of independent movement?

A. P and Q.
B. P and R.
C. R and S.
D. Q and S.

D.1 43

The next three questions refer to the following information.

There are several factors which influence the availability and use of oxygen in man. The table below shows the average values for persons suffering from oxygen deficiencies for a variety of reasons. The average value for healthy individuals is also given.

Group	Haemoglobin content of blood (g/100mL) of blood)	Oxygen content of arterial blood (mL /100mL) blood)	Oxygen content of venous blood (mL /100mL) blood)	Volume of blood pumped by heart (L /minute)
Healthy	15	19	15	5.0
A	15	15	12	6.6
B	8	9.5	6.5	7.0
C	16	20	13	3.0
D	15	19	18	5.0

Which set of data is most consistent with that of a person suffering from a dietary iron deficiency?

A. A. C. C.
B. B. D. D.

B.2 44

Which set of data is consistent with that of a person with a high tissue content of a poison which prevents the use of oxygen in the tissues?

A. A. C. C.
B. B. D. D.

D.1 45

Which set of data is consistent with that of a person who has just climbed a mountain to a point where atmospheric oxygen is noticeably less than that usually experienced?

A. A. C. C.
B. B. D. D.

A.1 46

This question refers to this table which shows the percentage of people of various races having various blood groupings.

POPULATION GROUP	BLOOD GROUP PERCENTAGES			
	O	A	B	AB
Australian aborigines	approx. 50	approx. 50	present in small numbers	0
Australians of European Descent	49	38	10	3
Chinese	46	23	25	6
English	43	48	8	1
Germans	40	40	15	5
Greeks	42	40	14	4
Indians	30	25	37	8
Japanese	30	38	22	10
South American Indians	100	0	0	0

Which blood group is most common in the human race?

A. A
B. B
C. AB
D. O

D.5 47

The chamber of the heart with the thickest wall is the

A. left ventricle. C. left atrium.
A3 B. right ventricle. D. right atrium. 48

OR

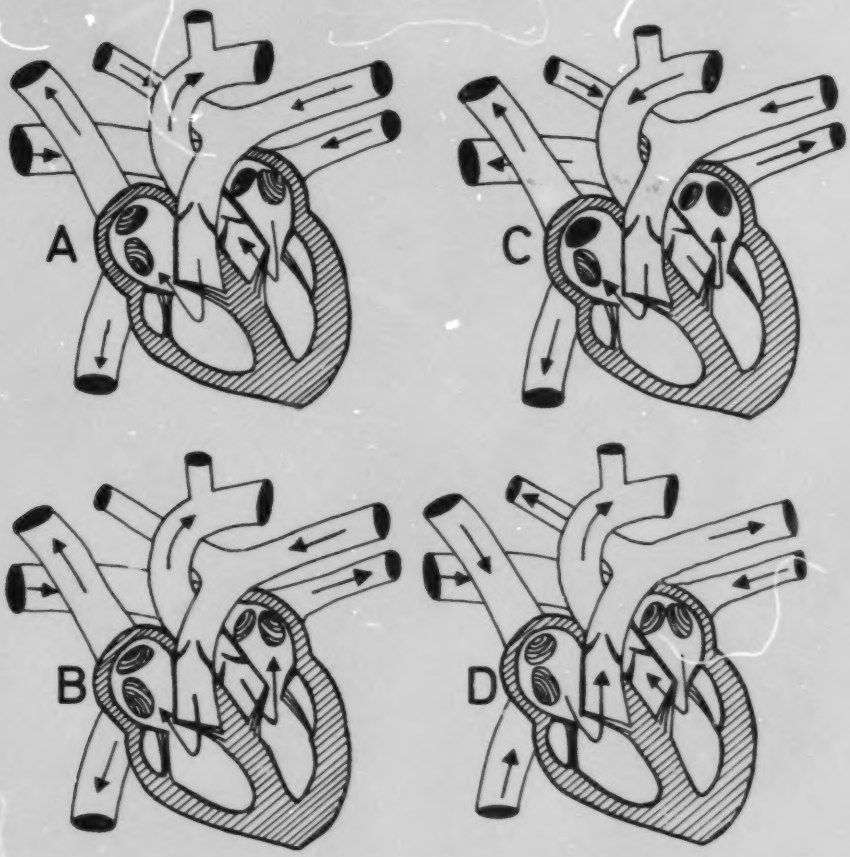
The left ventricle has a thicker wall than the right ventricle because it

A. pumps blood all around the body.
B. stores as well as pumps blood.
C. pumps more blood than the right ventricle.
A3 D. beats more often than the right ventricle. 49

The main component of the plasma of the blood is

A. amino acids. C. red blood cells.
D1 B. haemoglobin. D. water. 50

Which diagram correctly shows pathways taken by the blood as it passes to and from the heart?



D1

51

In a study of circulation in mammals a dissection of a heart is made.

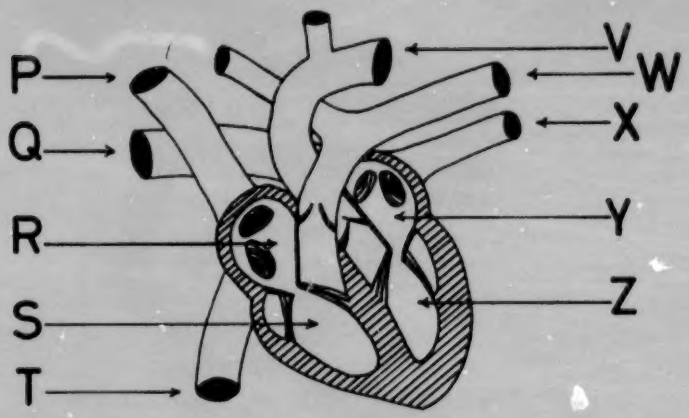
Which of the following statements cannot be checked by a student by making simple observations?

A. Muscular walls of the lower compartments of the heart are thicker than those in the upper part.
B. Valves in the heart prevent back flow from the ventricle to the atrium.
C. Blood carries digested food from the heart to the cells.
D. Blood is carried from the right side of the heart through arteries.

C.3

52

The next 8 questions refer to the diagram of a human heart.



Which blood vessel is the aorta?

C3 A. P B. T C. V D. W 53

Which chamber of the heart receives blood from the lungs?

C2 A. R B. S C. Y D. Z 54

Which chamber of the heart pumps blood to the lungs?

B1 A. R B. S C. Y D. Z 55

Which blood vessels return blood to the heart from the body (not from the lungs)?

A2 A. P and T. C. Q and T.
B. Q and X. D. P and X. 56

Which chamber of the heart is called the "left atrium"?

C1 A. R B. S C. Y D. Z 57

Which blood vessels could be called arteries?

B1 A. P, Q and W only. C. V, Q and X only.
B. V and W only. D. Q and W only. 58

Which blood vessel is returning blood from the right lung to the heart?

B1 A. P B. Q C. T D. X 59

Blood returns to the heart from arms and head through which vessel?

A2 A. P B. Q C. W D. X 60

HEALTH

Read the following information and then answer the following three questions.

ACIDS AND TEETH

When food is eaten and some of it remains between the teeth, bacteria in the mouth feed on the food. Chemical changes occur, and the bacteria give off weak acids as waste products. These acids will attack the teeth causing tooth decay.

Most food decay takes place where food is caught between the teeth. The top of the tooth (the crown) is covered with Enamel, which is the hardest substance in the body. The inside of the tooth is made of a softer substance called Dentine. If the hard enamel is decayed and the acids and bacteria get into the dentine, then the tooth can be damaged very rapidly. The best way of getting rid of bacteria, foods and acids is by brushing the teeth.

Bacteria produce

A. acids. C. enamel.
A5 B. dentine. D. food. 61

The part of the tooth that decays the quickest is the

A. crown. C. enamel.
B4 B. dentine. D. top. 62

The best way to stop acid forming in the mouth is to remove the

A. bacteria. C. food.
C3 B. chemical changes. D. teeth. 63

Many scientists are trying to find new ways of curing human sickness. They usually try their remedies on other animals first.
Which of the following groups of animals would they be most likely to choose?

A. Fish, frogs and rats.
B. Snakes, birds and rabbits.
C. Frogs, birds and mice.
D5 D. Rats, rabbits and monkeys. 64

Humans working in the presence of the products of radioactive decay must be shielded since the products are dangerous to health. From which of the following radioactive decay products do humans require the most shielding?

A. α (alpha) particles. C. $\beta+$ (beta plus) particles.
B. $\beta-$ (beta minus) particles. D. γ (gamma) rays.

D.3 65

Water pollution levels in areas near human sewage treatment works are measured by counting the number of bacteria of the species *E. coli* in samples of the water being tested. *E. coli* is a common but harmless bacterium found in the alimentary canal of humans.
This method of measurement is used because it is known that

A. an overabundance of *E. coli* in water can cause illness in humans.
B. if *E. coli* can survive in the water other species of bacteria which may be harmful can also survive.
C. if *E. coli* are present other species which may be harmful to humans cannot survive.
D. the presence of *E. coli* indicates that the water is palatable to humans.

B3. 66

The tropical disease Malaria is carried by one species of mosquito. To combat Malaria thin layers of oil have been sprayed on the surface of water where mosquitoes breed.
The most likely reason to spray oil on the surface of the water is that the oil

A. sinks and poisons the larvae in the water.
B. floats on the surface of the water and stops the larvae getting air.
C. sinks and gets into the bristles thus stopping the larvae swimming.
D. floats on the surface and stops the larvae from getting food.

B.3 67

SENSES

A cricket player loses the sight of one eye in an accident, but the other one is not affected. When he plays cricket, he will find that

A. he cannot focus on the ball when it is moving.
B. he can only see the ball half of the time.
C. the ball looks smaller to him.
D. it is hard to judge how far away the ball is.

D3. 68

The eye is often compared with a camera. Which of the following parts of the eye would correspond with the film in the camera?

A. Cornea. C. Optic Nerve.
D3 B. Lens. D. Retina. 69

Which of the following parts of the eye has the same function as the diaphragm of a camera?

A. Aqueous humour. C. Pupil.
B1 B. Iris. D. Retina. 70

In a camera the image is focused on the film by moving the lens in relation to the film. In the eye, the image is focused by changing the

A. diameter of the pupil.
B. curvature of the cornea.
C. thickness of the lens.
C1 D. shape of the retina. 71

The retina of the eye is the

A. hole in the centre of the iris.
B. place where the image is formed.
C. structure controlling the amount of light entering the eye.
B1 D. part which carries messages to the brain. 72

A person with one eye would have difficulty

A. judging distances.
B. seeing different colours.
C. judging brightness.
A3 D. seeing in the dark. 73

Mammals are made up of a number of different body systems, all of which function together as an integrated whole.

Which of the following would result if the brain of a mammal was destroyed but all other systems continued to function?

A. Inability to digest food.
B. Heart would stop beating.
C. Reflexes would cease to function.
D. No co-ordination of body functions.

D.3 74

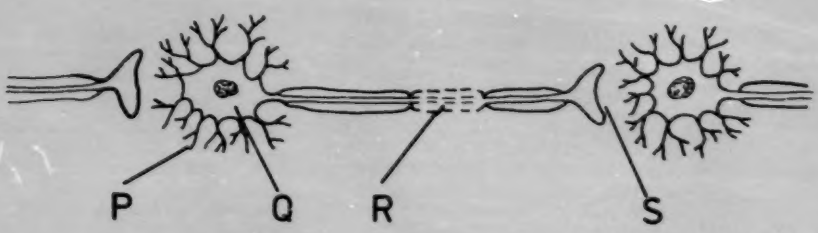
Which one of the following is a list of sense organs?

A. Lungs, brain, stomach.
B. Eyes, ears, tongue.
C. Liver, kidney, nose.
D. Heart, pancreas, spinal cord.

B.5 75

The next two questions refer to the following information.

The following diagram shows a nerve cell and its interconnections with two other nerve cells of a nerve pathway.



The synapse is labelled

A. P B. Q C. R D. S

D.1 76

The structure labelled P is

A. a cell body.
B. a dendrite.
C. an axon.
D. a sheath.

B.1 77

You can best avoid an unpleasant flavour by

A. holding your nose
B. closing your eyes.
C. plugging your ears.
D. cleaning your teeth.

A.3 78

The spinal cord

A. controls the activity of all the body's moving parts.
B. controls many of the bodily processes, such as the beating of the heart and blood circulation.
C. acts as a reflex centre.
C2 D. is where voluntary decisions are made. 79

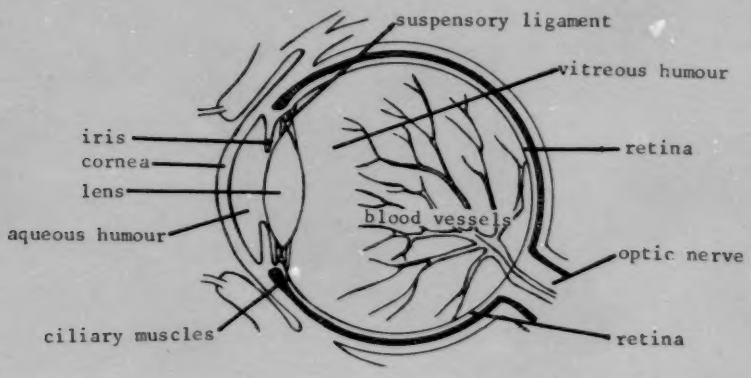
Neurones which conduct messages to the central nervous system are called

A. connecting neurones. C. motor neurones.
A1 B. interneurones. D. sensory neurones. 80

Nerves which detect chemical stimuli are found in the

A. skin.
B. nose and mouth.
C. stomach and intestines.
B1 D. kidneys and liver. 81

Look carefully at the following labelled diagram of the eye.



The eye is often compared with a camera. Which of the following parts of the eye would correspond with the film in the camera?

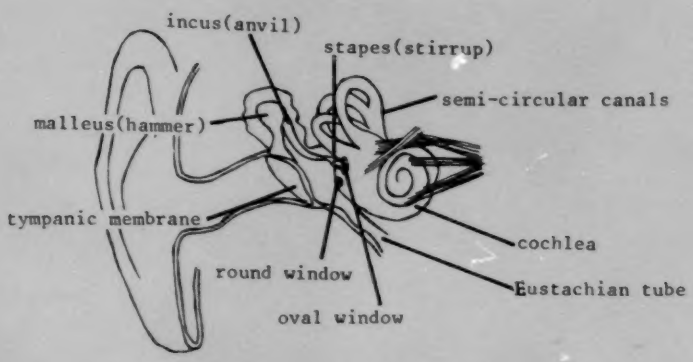
A. Cornea. C. Optic Nerve.
D1 B. Lens. D. Retina. 82

Which of the following parts of the eye has the same function as the diaphragm of a camera?

A. Aqueous humour. C. Pupil.
B1 B. Iris. D. Retina. 83

(82, 83 same as question 69, 70 page 29)

The next question refers to this diagram.



Sound is transmitted from the ear drum or tympanic membrane to the cochlea by means of

A. fluid filled semicircular canals.
B. fluid filled cochlea.
C. fine hairs in the Eustachian tube.
D3 D. small bones, the hammer, anvil and stirrup. 84

Which of the following parts of the ear is responsible for maintaining balance?

A. Cochlea. C. Pinna.
D1 B. Eustachian tube. D. Semi-circular canals. 85

A sound is heard when the

A. sound waves reach the eardrum.
B. bones of the ear begin to vibrate.
C. fluid of the cochlea begins to vibrate.
D3 D. message from the nerves reaches the brain. 86

The function of the middle ear is to change the incoming sound message to

A. chemical vibrations. C. magnetic vibrations.
D1 B. electrical vibrations. D. mechanical vibrations. 87

The ear ossicles conduct sound from the

A. semi-circular canals to the cochlea.
B. oval membrane to the tympanum.
C. tympanum to the oval membrane.
C1 D. cochlea to the semi-circular canals. 88

Which of the following parts of the ear is responsible for collecting sound waves.

A. Cochlea. C. Pinna.
C5 B. Eustachian tube. D. Semi-circular canals. 89

MUSCLES

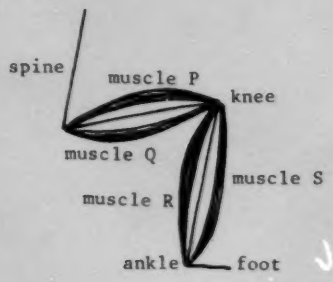
Which joint is a ball and socket joint?

A. Elbow.
B. Knee.
C. Shoulder.
D. Wrist.

C5

90

The next question refers to this diagram of a leg drawn as if a person was sitting.



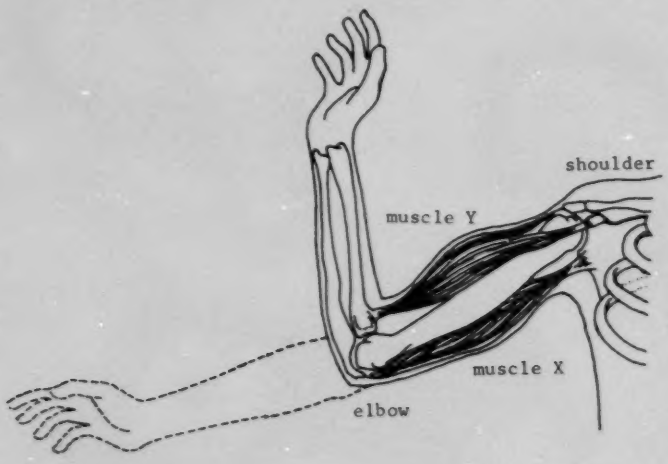
Which muscle(s) would be used to straighten the leg?

A. P only.
B. P and S only.
C. Q only.
D. Q and R only.

A1

91

The next question refers to the following diagram of an elbow and shoulder joint with muscles X and Y which connect them.



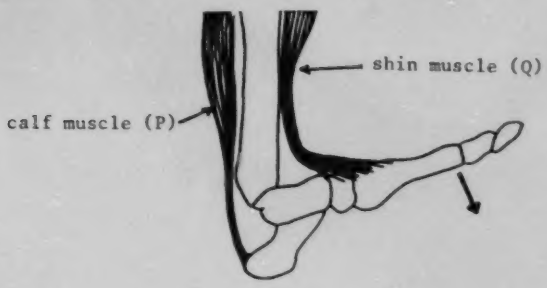
Consider this action:
A man moves his arm from the bent position in the diagram so that it is straight (dotted position). His arm stretches because an impulse from the brain has caused

A. muscle X to contract.
B. muscle Y to contract.
C. muscle X to extend.
D. muscle Y to extend.

A2

92

The next question refers to the diagram of a foot.



If the foot is moved in the direction shown by the arrow, which action by the muscles would produce the movement?

A. P relaxes, Q contracts.
B. P contracts, Q relaxes.
C. P and Q contract.
D. P and Q relax.

B3 93

The bones which make up the lower leg are the

A. femur and fibula.
B. fibula and tibia.
C. humerus and ulna.
D. clavicle and tibia.

B3 94

Bones are attached to each other by

A. cartilages.
B. muscles.
C. ligaments.
D. tendons.

95

In the joints listed below, the one which allows the greatest freedom of movement is the joint between the

A. femur and the tibia.
B. femur and the pelvis.
C. atlas and the axis vertebrae.
D. humerus and the scapula.

96

Which of these joints has the greatest freedom of movement?

A. Elbow.
B. Hip.
C. Shoulder.
D. Wrist.

C3 97

The tissue connecting muscle to bone is called

A. cartilage.
B. gristle.
C. ligament.
D. tendon.

D3 98

If you had a bone from a human skeleton that would form a hinge joint at one end and a ball and socket joint at the other end, you could have the

A. atlas.
B. femur.
C. pelvis.
D. scapula.

B3 99

HORMONES

The next 5 questions refer to the following information

Hormones are substances formed by particular organs (endocrine glands) and liberated into the general blood circulation which carries them to their sites of action elsewhere in the body. Here they serve to regulate the rates of specific processes.

Because of the regulating nature of their roles, either deficiency or excess in the circulating levels of the hormones may lead to disorders in the normal development and function of the body.

A patient has the following symptoms:

(a) He is always thirsty.
(b) He produces greater than average quantities of urine.

It is suggested that these symptoms could be caused by either lack of hormone X, or lack of hormone Y, but not lack of both.

The following information relating to hormones X and Y is known.

(i) X and Y are produced by different glands.
(ii) Lack of X causes loss of glucose from the body into the urine but lack of Y does not.
(iii) In a healthy person glucose is not present in the urine.

In each of questions 1 to 5, an observation is given. Each observation is independent of the others.

Key: In each case, state whether the observation

A. suggests lack of X is a cause of the symptoms.
B. suggests lack of Y is a cause of the symptoms.
C. suggests lack of both X and Y is a cause of the symptoms.
D. supports neither suggestion.

100

B4 Hormone Y is injected into the patient and the symptoms disappear.

A3 The urine is tested and glucose is found to be present. 101

D2 The patient drinks a lot of water. Symptom (a) tends to disappear but (b) becomes more acute. 102

A2 The patient is given glucose and the symptoms disappear. 103

B2 A large part of the gland which produces Y is removed and the symptoms become more acute. 104

In the human body, the endocrine glands are controlled by hormones produced in the

A. cerebellum.
B. pituitary.
C. liver.
D. pancreas.

105

In the human body, the endocrine glands produce

A. anti-bodies.
B. blood cells.
C. hormones.
D. vitamins.

C3

106

One endocrine (hormone-making) gland is often called the "master gland". This is most likely to be the

A. adrenal gland.
B. lymph gland.
C. pituitary gland.
D. thyroid gland.

C3

107

When a person is frightened, a hormone is released into the blood. The part of the body it is released from is the

A. adrenal gland.
B. pancreas.
C. pituitary gland.
D. thyroid gland.

A3

108

A sudden fright in man causes the "fright or flight response". Blood flows to the limbs and brain and away from the skin surface and unnecessary organs. Blood sugar levels rise. This overall response is caused mainly by

A. a hormone.
B. a sensory neurone.
C. the brain.
D. the spinal cord.

A2

109

A fractured skull can be a very serious injury because

A. once the skull is fully grown it ceases to grow again.
B. the broken skull could affect the brain.
C. the skull contains nerve endings which, if broken, could affect the nervous system.
D. a broken skull results in continuous bleeding which is difficult to control.

B3

110

DIGESTION

The changing of insoluble food substances into soluble ones is called

A. assimilation.
B. digestion.
C. peristalsis.
D. osmosis.

111

For absorption of food to occur, the food must first be digested. The sequence which most commonly results in absorption would be

A. simple molecules + digestive enzymes → complex molecules.
B. complex molecules → simple molecules.
C. complex molecules → enzymes.
D3 D. complex molecules + enzymes → simple molecules.

112

The organ or body part which is <u>not</u> part of the digestive tract is

A. intestine.
B4 B. kidney.
C. oesophagus or gullet.
D. pancreas.

113

One of the following is <u>not</u> associated with digestion. That one is

A. adrenal glands.
A4 B. liver.
C. pancreas.
D. salivary glands.

114

There are two types of digestion, chemical digestion and mechanical digestion. In the mouth

A. only mechanical digestion occurs.
B. only chemical digestion occurs.
C3 C. both chemical and mechanical digestion occur.
D. no digestion occurs as it begins in the stomach.

115

Digestion begins in the

A. mouth.
A3 B. throat.
C. stomach.
D. small intestine.

116

The purpose of incisor teeth is to

A. tear flesh of dead animals.
B. grind food with saliva.
C4 C. cut food into small pieces.
D. crack open bones to obtain the marrow.

117

The enzyme which assists in the digestion of starches in the mouth is

A. maltose.
C1 B. pepsin.
C. ptyalin.
D. zylose.

118

The first step in the digestion of starch produces

C1

A. cellulose.
B. fatty acids.
C. glucose.
D. glycerol.

119

The epiglottis prevents

A4

A. food from entering the windpipe.
B. air from going into the stomach.
C. carbon dioxide from going into the bloodstream.
D. salt from going into the kidneys.

120

The process of peristalsis is

B3

A. the release of energy in the cells of the body.
B. contractions forcing food through the digestive system.
C. a method used by plants to manufacture their food.
D. removal of waste materials by the kidneys.

121

A student who tried to drink a glass of water while standing on his head, would be able to do it because of

D3

A. the vacuum created in the stomach.
B. the force exerted by the tongue.
C. peristalsis in the small intestine.
D. peristalsis in the oesophagus.

122

Chyme is produced in the stomach by the action of gastric juices which contain

D4

A. carbohydrates and salts.
B. proteins and salts.
C. vitamins and minerals.
D. acids and enzymes.

123

Pepsin digests protein to produce

A4

A. amino acids.
B. chyme.
C. muscles.
D. nerves.

124

Pancreatic juices contain three different enzymes which digest

D3

A. cellulose fibre and starch.
B. carbohydrates, salts and milk.
C. minerals, vitamins and proteins.
D. carbobydrates, proteins and fats.

125

Digestive enzymes from the pancreas enter the alimentary canal at the

A2

A. duodenum.
B. intestine.
C. liver.
D. stomach.

126

The emulsification of fats in the process of digestion

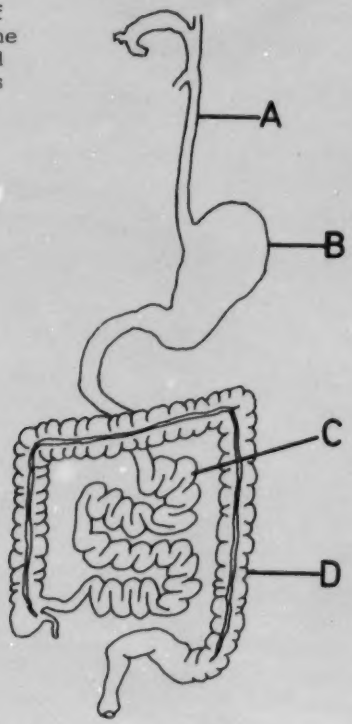
A. increases their surface area.
B. is caused by hormones.
C. occurs in the pancreas.
A1 D. coagulates them to form faeces. 127

The function of bile in the process of digestion is to

A. dissolve salts. C. hydrolyse sugars.
B3 B. emulsify fats. D. precipitate water. 128

The next question refers to the diagram on the right.

Look carefully at the diagram of the human digestive system on the right. In which of the labelled parts of the digestive system is digestion and absorption of the food most likely to occur?



C2 129

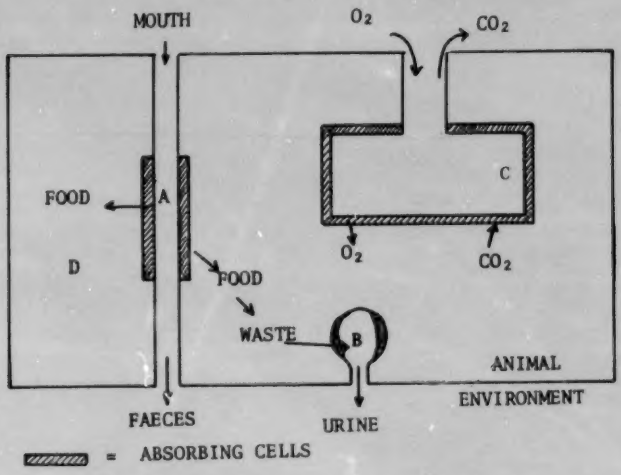
In which part of the human digestive system does the digestion of cellulose occur?

A. Stomach.
B. Small intestine.
C. Large intestine.
D1 D. None of these. 130

Most of the water is absorbed during digestion in the

A. stomach. C. large intestine.
1 B. kidney. D. liver. 131

This question refers to this diagram.



Study the diagram above. Which section (A, B, C or D) represents the intestine of the animal?

A. A B. B C. C D. D

A2. 132

A person has a particular organ removed in an operation. Following the operation he is advised by his doctor to avoid fats in his diet.

The organ which was removed was most probably

A. his appendix.
B. his gall bladder.
C. his liver.
D. part of his large intestine.

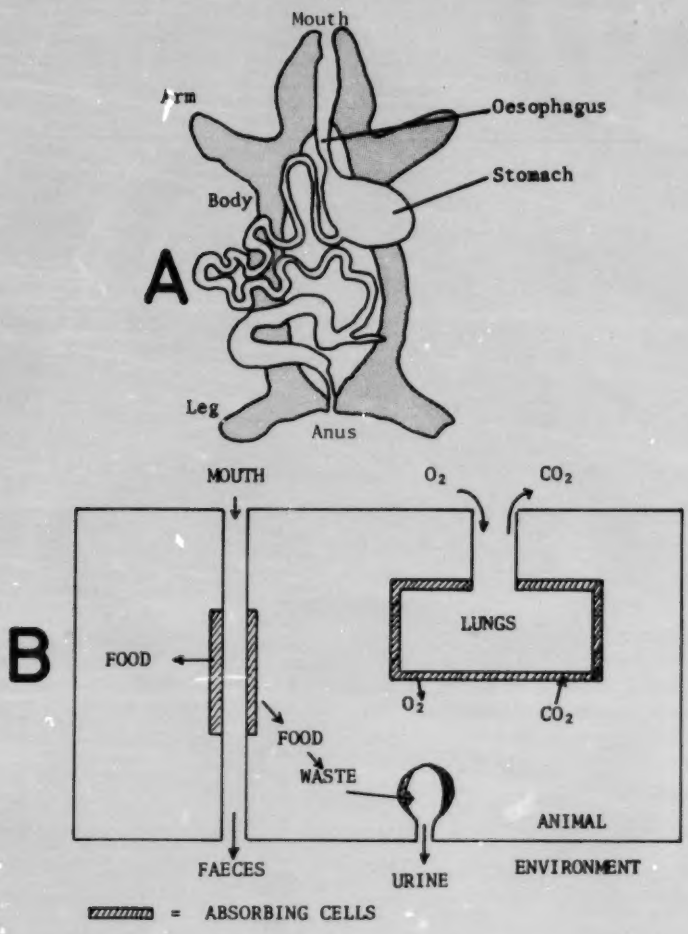
B2. 133

A scientist made some bread from flour that contained radioactive elements. She fed the bread to rats in her laboratory.
If she wanted to find out whether the rats assimilate this food, she should look for evidence of radioactivity in their

A. stomachs. C. faeces.
B. small intestines. D. tissues.

D3. 133a

This question refers to these two diagrams.



Consider the diagrams above. Diagram B is a simplified version of Diagram A.

Which part of Diagram B is incorrect because it is not shown in Diagram A? Not all parts of the diagrams have been labelled:

A. oesophagus.
B. lungs.
C. anus.
D. intestines.

B.2

Glucose is converted to glycogen in the

A. heart.
B. kidney.
C. large intestine.
D. liver.

D1

135

Food passes from the alimentary canal into capillaries in the villi by

A. diffusion.
B. osmosis.
C. peristalsis.
D. solution.

A1

136

The process by which non-living foodstuff is converted intp living tissue is called

A. assimilation.
B. esterification.
C. photosynthesis.
D. reproduction.

A3

137

In man the appendix is very small. In the rabbit it is large and very important to the digestive system. The appendix would probably have an important function in digestion of

A. protein.
B. cellulose.
C. fats.
D. vitamins.

B3.

138

(Same as Page 40 Question 115)

There are two types of digestion, chemical digestion and mechanical digestion. In the mouth

A. mechanical digestion only occurs.
B. chemical digestion only occurs.
C. both chemical and mechanical digestion occur.
D. no digestion occurs as it begins in the stomach.

C3.

139

When proteins are digested and ready to be absorbed in the small intestine, they are in the form of

A. glucose.
B. fatty acids.
C. amino acids.
D. glycerol.

C.1

140

FOODS

The next two questions refer to this table.

FOOD	FOOD TYPE
Bread	Starch (carbohydrate)
Butter	Fat
Meat	Protein
Orange	Vitamin C

The digestion of one of the foods, mentioned above, begins in the mouth due to the effect of saliva. The food is

A. bread. B. butter. C. meat. D. orange.

A1.

141

If the liver suddenly stopped producing bile, which of the above foods would be difficult to digest?

A. bread. B. butter. C. meat. D. orange.

B1.

142

Which of the following advertising slogans for food refers to the way your body uses the food you eat?

A. What you eat today, walks and talks tomorrow.
B. It's polyunsaturated, made from pure vegetable oils.
C. It's full of natural fibres, vitamins and minerals.
D. Made to a recipe, not just a price.

A3.

143

When sucrose is treated with dilute acid it will give a positive test with

A. Biuret reagent. C. Benedict's solution.
B. iodine solution. D. Sudan III dye.

C1.

144

A food substance is boiled in water. When tested with iodine solution it gives a blue colour. The food is most likely to be

A. vegetable. B. meat. C. milk. D. egg.

A2.

Which of the following substances would be described as a reducing or simple sugar by its reaction with Benedict's solution?

A. Cellulose.
B. Glucose.
C. Starch.
D. Sucrose.

B3 146

A student added some Benedict's solution to a sample of food in a test tube.
Which result indicates the presence of glucose in a food?

A. A brick-red precipitate forms on heating.
B. A white precipitate forms - remains white on heating.
C. Solution turns a deep blue-black colour.
D. A clear layer separates from the mixture and forms on top of the water.

A2 147

A food which gives a positive test with iodine solution must contain

A. fat.
B. glucose.
C. protein.
D. starch.

D5 148

Which of the following foods would give a positive test with Benedict's solution?

A. Fats.
B. Proteins.
C. Starch.
D. Sugar.

D1 149

When tested, a certain food gives a positive reaction with iodine, Biuret solution and D.I.P. solution. This food contains

A. starches, sugars and proteins.
B. sugars, proteins and vitamin C.
C. starch, protein and vitamin C.
D. starch, sugar and protein.

C1 150

Some food is boiled in water and when tested with iodine solution gives a blue colour. The food is most likely

A. egg.
B. meat.
C. milk.
D. vegetable.

D3 151

The cellulose in our diet is

A. stored in the liver.
B. the source of instant energy.
C. the bulk of our solid waste.
D. necessary growth.

C2 152

A certain food contains the elements - carbon, hydrogen, oxygen and nitrogen. The food is

A. fat.
B. protein.
C. starch.
D. sugar.

B3 153

Which food types are composed of the same elements?

A. Proteins, starches and sugars.
B. Carbohydrates, vitamins and fats.
C. Sugars, fats and starches.
C3 D. Proteins, fats and oils. 154

Which of the following constituents of food provides the greatest amount of energy per unit of mass?

A. Carbohydrates. C. Proteins.
B1 B. Fat. D. Vitamins. 155

A food which is rich in protein is

A. bread. C. honey.
D4 B. margarine. D. meat. 156

The protein in our diet is

A. stored as fat underneath the skin.
B. an instant source of energy.
C. necessary for building body cells.
C4 D. decomposed into glucose. 157

Which substance is found in all food?

A. Protein. C. Sugar.
D3 B. Starch. D. Water. 158

The food which is <u>not</u> a significant source of energy is

A. fat. C. starch.
B1 B. protein. D. sugar. 159

The next question refers to the quotation below.

"A good sound dietary plan ensures that the food necessary for good health is included. For good health, the body needs building materials to repair and replace tissues ..."

Which one of the following classes of food is most suitable on its own for this purpose?

A. Carbohydrate. C. Protein.
C3 B. Fats. D. Vitamins. 160

The element in mineral salts which helps to harden tooth enamel is

A. fluorine.
B. iodine.
C. nitrogen.
D. phosphorus.

A5

161

Which of the following is the best example of a high protein diet?

A. Bananas, eggs and potatoes.
B. Bananas, fish and tomatoes.
C. Eggs, meat and fish.
D. Meat, potatoes and tomatoes.

C5

162

Which element occurs in proteins, but not in fats?

A. Carbon.
B. Hydrogen.
C. Nitrogen.
D. Oxygen.

C3

163

Why is water an important metabolic requirement?

A. Water contains many important vitamins required by the body.
B. There is so much water in the world to drink.
C. Our bodies would dehydrate without water, and we would die.
D. Water is used in the body as a solvent for the transport of many materials.

D1

164

Citrus foods and green vegetables are an important source of which vitamin?

A. A B. B C. C D. D

C5

165

Which of the following compounds is composed of a number of amino acids linked together?

A. Fats.
B. Proteins.
C. Starches.
D. Vitamins.

B1

166

One of the major functions of foods is an energy source. Which of the following is the major energy food?

A. Enzymes.
B. Proteins.
C. Sugars.
D. Vitamins.

C1

167

A proper diet must include protein. This is needed for

A. growth and the repair of tissues.
B. making vitamins for the body.
C. developing resistance to disease.
D. supplying the energy of the body needs.

A4

168

The body needs a supply of iodine so it can make

C1
A. bile.
B. adrenalin.
C. thyroxin.
D. white blood cells.
169

The body needs iron to produce

C3
A. bile.
B. muscle tissue.
C. red blood cells.
D. thyroxin.
170

Of the food substances listed below, which one is NOT considered to be an organic substance?

C2
A. Carbohydrates.
B. Fats.
C. Mineral salts.
D. Vitamins.
171

Which of the following substances CANNOT be made by the human body?

B3
A. Fats.
B. Mineral Salts.
C. Proteins.
D. Sugars.
172

Essential vitamins needed by the body are usually obtained from the food we eat. One vitamin, however, is produced in the human skin, by exposure to sunlight or ultra-violet light. Which vitamin is it?

D3
A. A B. B C. C D. D
173

Vitamin deficiencies can cause diseases and other problems. These problems include skin infections like boils, and poor night vision. Both of these examples are caused by a deficiency of vitamin

A2
A. A B. B C. C D. D
174

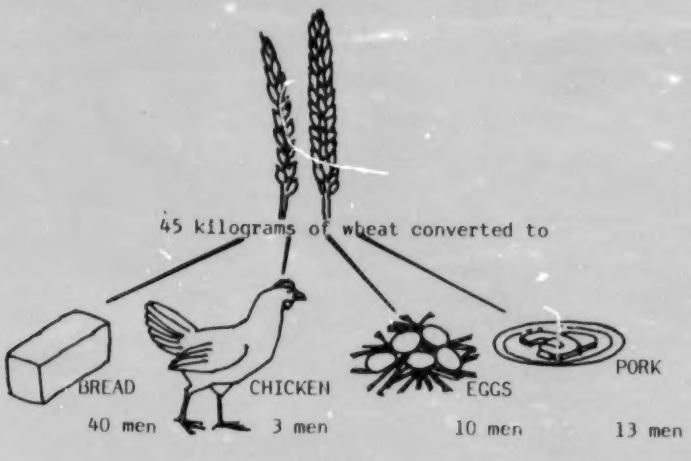
Which four elements are most abundant in man?

B2
A. Carbon, chlorine, hydrogen, sulfur.
B. Carbon, hydrogen, nitrogen, oxygen.
C. Calcium, hydrogen, oxygen, sulfur.
D. Hydrogen, iron, nitrogen, oxygen.
175

Mary wanted to understand why food which is kept in a refrigerator stays in good condition longer than food which is not refrigerated. She would probably need to know

D5
A. what keeps a refrigerator cool.
B. what vitamins are contained in various foods.
C. if bacteria are plant or animal.
D. what causes food to spoil.
176

The next question refers to the diagram below.



The number of men that can be fed for one day on 45 kilograms of wheat depends on how the wheat is used. If the wheat is changed into bread, then it will feed forty men. However, if the wheat is used to rear chickens, the number of chickens that would eat 45 kilograms of wheat would feed only three men. When you eat chicken you are effectively eating a great deal of plant material.

Why will the bread made from the 45kg of wheat feed so many more men than the other substances?

A. Chickens are not as nutritious as bread.
B. All the chemical energy in the wheat goes into the bread.
C. Pigs are fed on scraps which have low energy content.

B5 D. The chicken, eggs and pork all weigh less than the bread. 177

The next two questions refer to the table below.

FOOD	FOOD TYPE
Honey	Sugar (Carbohydrate)
Butter	Fat
Peanuts	Oil
Fish	Protein

Which food, after digestion, would be used most readily to supply energy by respiration?

A3 A. Honey. B. Butter. C. Peanuts. D. Fish. 178

Which food, after digestion, is most important in making new body tissue?

D4 A. Honey. B. Butter. C. Peanuts. D. Fish. 179

EXCRETION

A student eats a large helping of cooked beetroot. About three hours later he finds that the urine he excretes is red. This indicates that

A. digestion of beetroot has not occurred.
B. the dye of beetroot passes through the body without change.
C. the kidneys of the student are not functioning correctly.
B3 D. the student had been drinking alcohol before eating the beetroot.

180

Which of the following substances would <u>not</u> be found in the urine of a healthy person?

A. Ammonia. C. Salts.
B3 B. Glucose. D. Uric acid.

181

In a normal human being, the highest concentration of blood sugar would be found in a blood vessel which led

A. to the kidney. C. away from the small intestine.
C2 B. away from the brain. D. to the large intestine.

182

Urea is a waste product from the body which is formed

A. in the liver and then excreted by the kidneys.
B. by the kidneys and then filtered from the blood.
C. as a direct result of digestion in the small intestine.
D1 D. during respiration in all living cells.

183

The <u>waste product</u> formed by the break-down of proteins is

A. amino acids. C. urine.
D1 B. fatty acids. D. urea.

184

In respiration, carbohydrates are broken down to give energy, and carbon dioxide and water are produced as waste products. These waste products are together excreted through the

A. kidneys. C. lungs.
C1 B. liver. D. skin.

185

When proteins are broken down in cells, nitrogen wastes are produced. These are filtered from the blood by the

A. kidneys. C. lungs.
A3 B. liver. D, skin.

186

Some waste products in the body accumulate in the blood and are removed by the kidneys by a filtration process. Which of the following substances would not normally leave the blood vessel in this way?

A. Blood cells.
B. Salts.
C. Urine.
D. Water.

A2.

187

Which of the following functions could NOT be carried out if both kidneys were removed from the body of a mammal?

A. Carrying of oxygen to the cells.
B. Removal of wastes from the blood.
C. Obtaining information by the senses.
D. Regulating of body temperature.

B.4

188

PLANTS

When a gardener transplants young seedlings he sometimes removes some of the leaves. He probably does this

A. to reduce water loss.
B. because young leaves do not serve any function.
C. so that the plant uses less food.
D. to induce the roots to grow.

A1. 189

It is possible to remove these leaves because

A. the plant would have some food stored in its stem and roots.
B. soil would soon provide the plant with food.
C. young plants do not require food.
D. roots will carry out photosynthesis until more leaves grow.

A1. 190

When young trees are transplanted some of the root system is always destroyed. One recommended practice is to prune back the branches of the young tree after transplanting. This procedure is recommended because

A. it reduces wind resistance.
B. the tree will not be able to flower.
C. insects are less likely to attack the tree.
D. it reduces transpiration.

D3. 191

OR

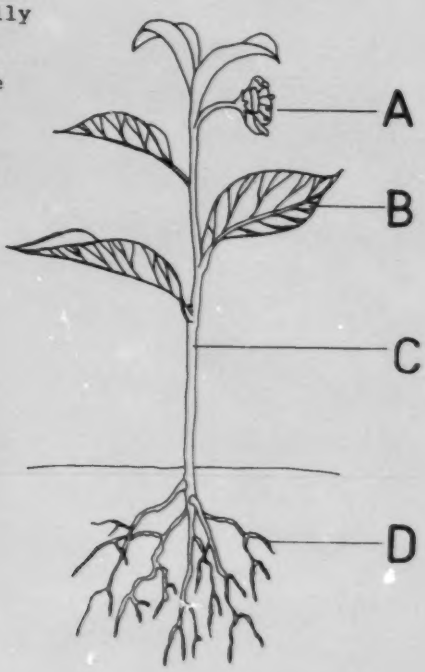
When young trees are transplanted some of the root system is always destroyed. One recommended practice is to prune back the branches of the young tree after transplanting. This procedure is recommended because

A. it reduces wind resistance.
B. the tree will not be able to flower.
C. insects are less likely to attack the tree.
D. it reduces water loss.

D3. 192

The next question refers to the diagram on the right.

To grow and function normally plants require adequate amounts of light and heat, water (H_2O), carbon dioxide (CO_2) and minerals (as a supply of elements like nitrogen (N), phosphorus (P) and potassium (K)). At which of A, B, C and D do these minerals enter the plant?



D4.

193

The table below is taken from a student's notebook and shows four parts of a plant and their functions.

PART	FUNCTION
Flower	Seed production, dispersal of seeds.
Leaf	Exchange of carbon dioxide and oxygen and water. Photosynthesis of sugars.
Roots	Anchorage, absorption of water and minerals, manufacture of glucose from sugars.
Stem	Support, conduction of water, minerals and sugars.

Which part has been given an incorrect function?

A. Flower. B. Leaf. C. Roots. D. Stem.

C1.

194

Which set of characteristics of living things listed below distinguishes flowering plants from other living things? Flowering plants

A. have green chlorophyll and make their own food.
B. reproduce by spores found under the leaves.
C. obtain all their food from other living things.
D3 D. have stems, leaves, fruit and seeds. 195

Which two functions below are functions of the roots of plants?

A. Anchorage and absorption.
B. Assimilation and respiration.
C. Food making and storage.
A4 D. Transpiration and excretion. 196

Most water enters the plant through the

C5 A. flowers. B. leaves. C. roots. D. stem.

Which of the following would be the best comment about the picture above?

A. The heart would be further up since trees grow faster.
B. The heart would not have moved since trees grow in height from the top.
C. There would be branches around the heart.
D. The heart certainly would be overgrown by bark.

B.2 197

What substance do the xylem vessels of the plant carry?

A. Carbon dioxide. C. Food.
D3 B. Oxygen. D. Water. 198

In a flowering plant the flower

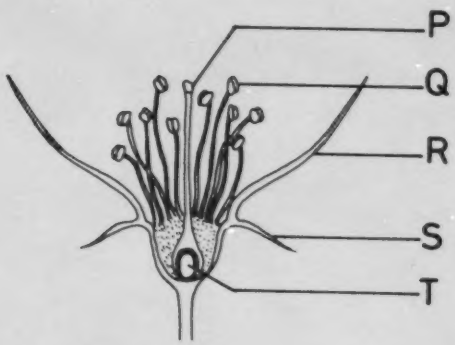
A. stores food.
B. makes food.
C. is where the sunlight is used.
D4 D. is concerned with reproduction. 199

In the 17th Century, van Helmont carried out an experiment to test the hypothesis that the food for plants is preformed in the soil. He planted a small twig of willow weighing 2.25kg in 90.00kg of soil. After 5 years he found that the willow weighed 76.05kg and the dried soil 89.44kg.

The loss of weight of the soil would most probably be due to absorption by the plant of

A. minerals. C. food.
A2 B. water. D. oxygen. 200

The next two questions refer to the diagram below.



Which part of the flower is responsible for protecting the bud?

D1 A. P B. Q C. R D. S 201

Part T is correctly termed the

A. calyx. C. ovary.
C5 B. carpel. D. receptacle. 202

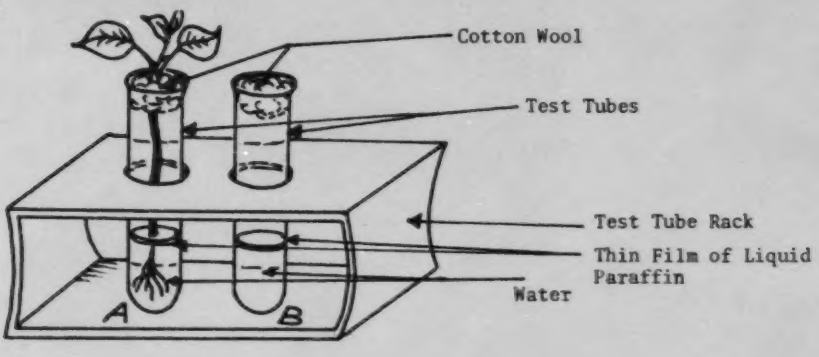
Germination is the breaking out of the embryo plant through the seed coat. The requirement(s) for germination is/are

A. air only. C. water and warmth.
C5 B. water only. D. air and water. 203

Navel oranges are rather unusual because they do not have seeds. Generally seeds are useful in growing new plants. Which of the following methods is used to propagate new navel orange trees?

A. Sexual reproduction. C. Reproduction of spores.
D3 B. Layering. D. Grafting. 204

The next two questions refer to the following diagram.



A student set up the above experiment and let it stand. After two days he observed that the water level in test tube A had dropped considerably compared with test tube B.

This drop in water level was most probably due to

A. evaporation in the air.
B. being soaked up by cotton wool.
C. transpiration by the plant.
C4 D. osmosis into the plant roots. 205

The thin film of paraffin oil was probably used to

A. prevent the air from reaching the roots.
B. help keep the plant alive be preventing bacteria entering the water.
C. prevent evaporation of water in both test tubes.
C3 D. provide some form of food for the plant. 206

During the germination of a plant seed, the energy for germination and initial growth comes from

A. daytime sunlight. C. the warmth of the soil.
B1 B. stored starch. D. water in the soil. 207

When plants are transplanted from a seed box to the open garden, they commonly wilt for a few days. This would be caused by

A. an increase in osmosis due to transplanting.
B. a decrease in osmosis due to the removal of some root hairs.
C. an increase in transpiration due to the change of soil.
B5 D. an increase in transpiration due to removal of some root hairs. 208

Xylem and phloem are cells which

A. absorb solutions in plants.
B. transport solutions in plants.
C. store food in plants.
B1 D. carry out photosynthesis. 209

Which one of the following has the least effect on the rate of photosynthesis?

A. Oxygen.
B. Carbon dioxide.
C. Chlorophyll.
D. Light intensity.

A.1 210

Which one of the following groups consists only of examples of plants or materials derived from plants?

A. Lichen - peanut - straw mat - yeast.
B. Moss - sea anemone - fruit juice - mushroom.
C. Timber - cereal - wool - silk.
A1 D. Vegetable - book - virus - alga. 211

To what form of energy is light energy changed during photosynthesis?

A. Chemical. C. Electrical.
A2 B. Heat. D. Mechanical. 212

Which of the following would occur as a result of a plant making its own food?

A. Oxygen is returned to the air.
B. Water is taken in by the leaves.
C. Sunlight is made into sugar.
D. Leaf colour changes from green to yellow.

A.2 213

Where in a plant is sugar changed to starch?

A. Leaves. C. Phloem.
A3 B. Pith. D. Xylem. 214

Green plants obtain nitrogen compounds from the soil despite the vast reservoir of nitrogen in the air. This is chiefly because

A. animals use most of the atmospheric nitrogen near the ground.
B. nitrogen being less dense than air rises above the maximum plant height.
C. nitrogen gas cannot pass through plant cell membranes.
D. the plants cannot use nitrogen in its gaseous form.

D.2 215

A stomate is a

A. part of an animal's digestive system.
B. small opening on the surface of a leaf.
C. small hole in a semi-permeable membrane.
B3 D. part of a plant root through which water enters.

216

Which statement below, concerning development in plants, is true?

A. Seeds develop into fruits, and zygotes develop into embryos.
B. Fertilised ovules develop into seeds, and ovaries develop into fruit.
C. Fertilised ovules form zygotes and embryos develop into fruit.
B1 D. Zygotes form fertilised ovules and fruits develop into new plants.

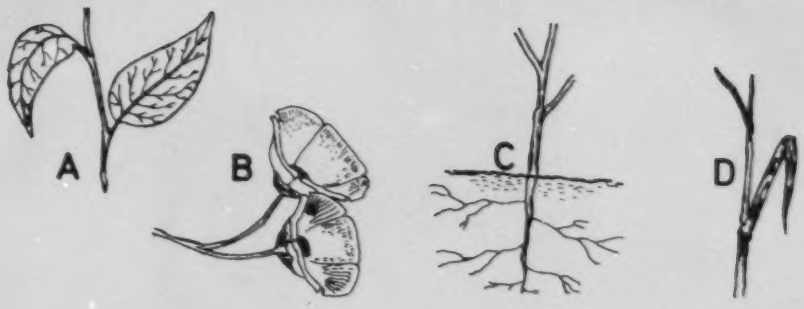
217

When we eat cucumbers, grapes, pumpkins and tomatoes, we are actually eating the

A. roots of the plant.
B. fruits of the plant.
C. leaves of the plant.
B3 D. seeds of the plant.

218

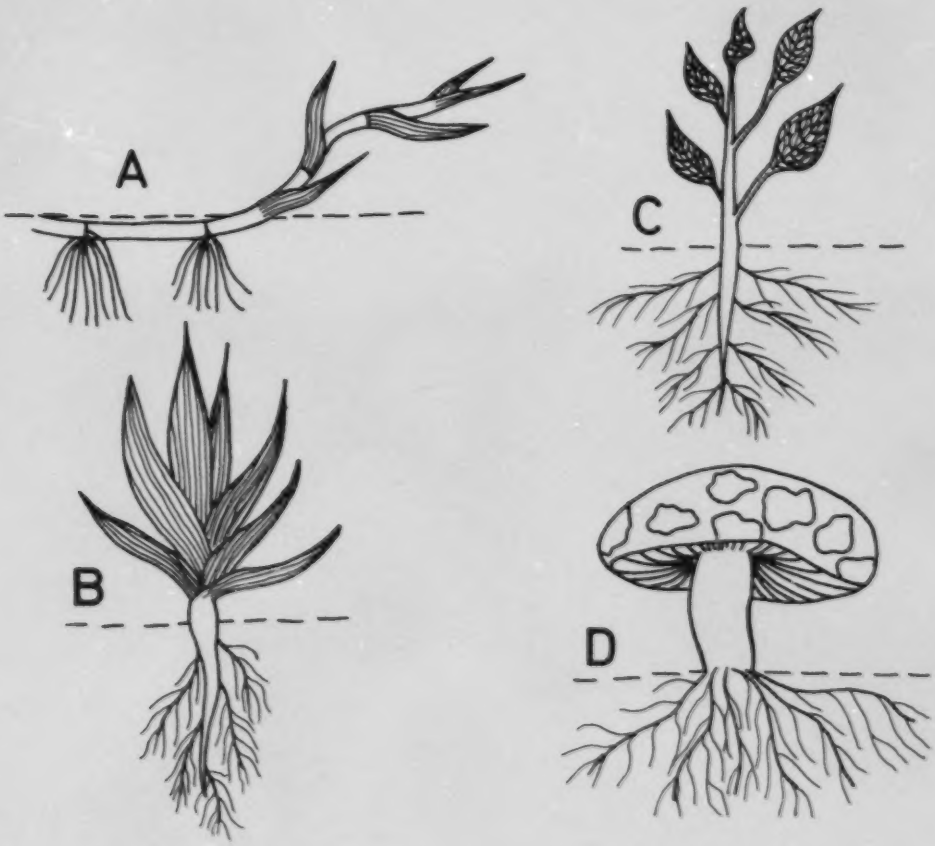
Which one of the following drawings shows a part of a *monocotyledon* plant?



D1

219

Which diagram has been drawn in a way which is biologically incorrect?



2

220

In terms of its role in reproduction, which one of the following parts of the flower corresponds to the testes of the animal?

A2

A. Anther.
B. Ovary.
C. Pistil.
D. Style.

221

Which part of a flower produces pollen

A1

A. anther.
B. sepal.
C. stigma.
D. style.

222

Some flowers are pollinated by birds and insects and others are pollinated by wind. One would expect the wind-pollinated flowers compared to the other type would

D1

A. be smaller in size.
B. be simpler in structure.
C. have smaller stamens.
D. be less bright in colour.

223

Pollination in plants refers to the process where

C1

A. pollen from the stigma is transferred to the style.
B. pollen combines with an ovule in the ovary.
C. pollen transfers from the stamen to the stigma.
D. the ovary releases an ovule to combine with pollen on the stigma.

224

In a flowering plant, the ovary

C3

A. is the male part.
B. is the female part and contains the pollen grains.
C. contains female sex cells.
D. grows into a seed after fertilization.

225

Which of the following statements about plant reproduction is correct?

B3

A. pollination and fertilization are the same process.
B. pollination takes place before fertilization.
C. fertilization can take place without pollination.
D. fertilization always involves insects.

226

Which is the correct sequence of development which occurs in a plant?

A1

A. Ovules → zygotes → embryo → seed.
B. Seed → fruit → zygote → ovule.
C. Zygote → seed → fruit → ovule.
D. Zygote → ovule → seed → fruit.

227

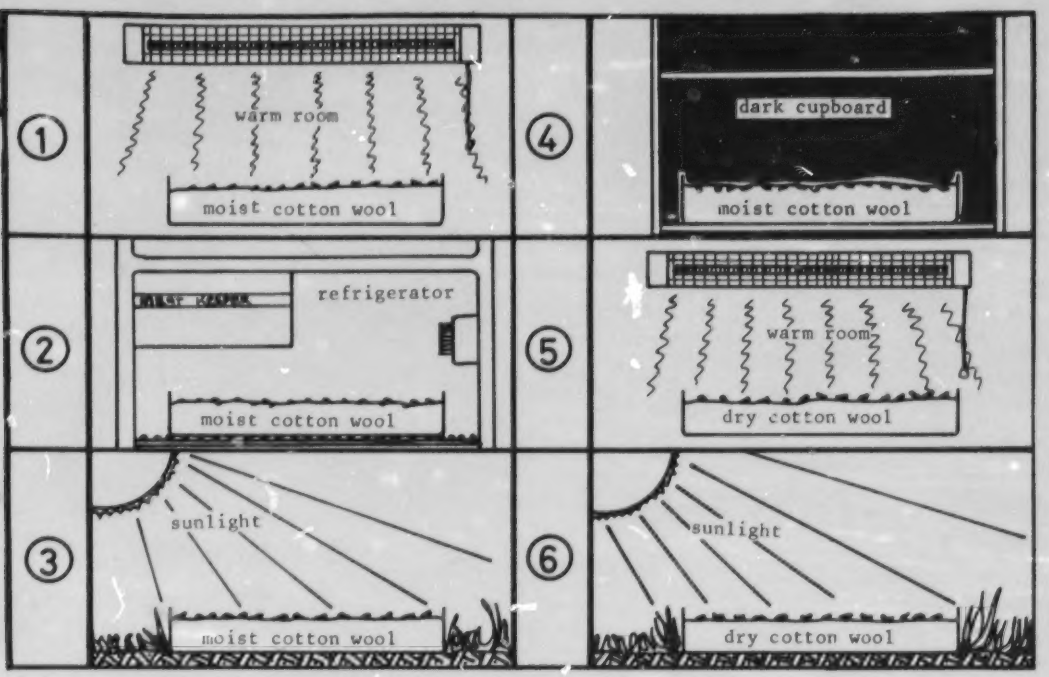
The portion of a plant which develops into the fruit is the

C1

A. embryo.
B. fertilised ovum.
C. ovary.
D. seed.

228

The next two questions refer to the following information.



After a few days he finds that the seeds in the following trays had germinated.

C3
A. Trays 1,2, 3.
B. Trays 2,3, 5.
C. Trays 1, 3, 4.
D. Trays 1, 2, 4.

229

The experiment above proved that if seeds a e to germinate they must have

D5
A. warmth only.
B. moisture only.
C. sunlight only.
D. warmth and moisture.

230

Two seeds of a green plant were placed in pots. One pot was placed in total darkness and the other left exposed to the light. The plants were given all other requirements. After three weeks each plant was carefully examined.

One difference you would expect the plant grown in the dark to show is

A. much shorter in height.
B. more leaves on the stem.
C. absence of starch in the leaves.
D. more extensive root area.

C1.

231

The next two questions refer to the information below.

A student wanted to find out if plants produce carbon dioxide in the same way that animals do. He prepared four tubes containing water and an indicator which changed colour in the presence of carbon dioxide. Water weed was placed in two tubes and all the tubes were sealed. The results are shown below.

TUBE	WEED	WHERE KEPT	COLOUR CHANGE
1	Yes	In the dark	Yes
2	No	In the dark	No
3	Yes	In sunlight	No
4	No	In sunlight	No

In this experiment the controls would be tubes

B2
A. 1 and 2.
B. 2 and 4.
C. 3 and 4.
D. 2, 3 and 4.

232

Using the information in the table, we can conlude that plants

D1
A. use up carbon dioxide while there is sunlight.
B. make carbon dioxide from water in the dark.
C. do not breathe in the same way as animals.
D. give out carbon dioxide when it is dark.

233

Starch is a useful storage substance in plants because it is

C1
A. soluble and has high potential energy.
B. soluble and has low potential energy.
C. insoluble and has high potential energy.
D. insoluble and has low potential energy.

234

The process which releases the energy stored in foods is called

D1
A. combustion.
B. digestion.
C. mastication.
D. respiration.

235

The structures on the surface of leaves through which water is lost are called

C2
A. chloroplasts.
B. pores.
C. stomates.
D. veins.

236

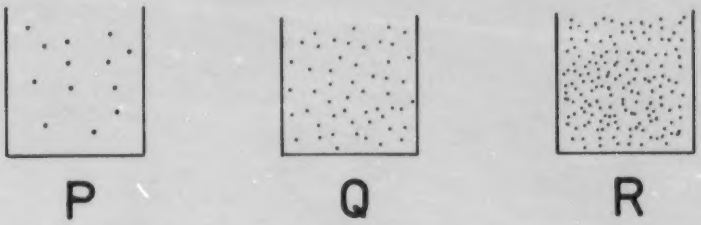
The part of the plant from which most water is lost is the

B4
A. flowers.
B. leaves.
C. roots.
D. stem.

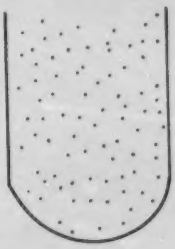
237

This question refers to the diagram below.

If the following diagrams represent the concentration of water molecules in three containers



and the diagram below represents the concentration of water molecules in a root hair



then it would be expected that the root hair would

A. swell if placed in container P.
B. shrink if placed in container Q.
C. take in water if placed in container R.
D. burst if placed in container R.

C.2 238

Some plants living in hot dry areas have leaves which have become reduced to spines. The main advantage of this is to

A. reduce water loss.
B. increase photosynthesis.
C. protect the plant from animals.
A4 D. aid in reproduction. 239

Plants conserve moisture on very dry days by

A. withdrawing their root hairs.
B. curling up their leaves.
C. dropping their branches.
B3 D. shedding their bark. 240

The name given to the process by which water is lost from the leaves of plants is

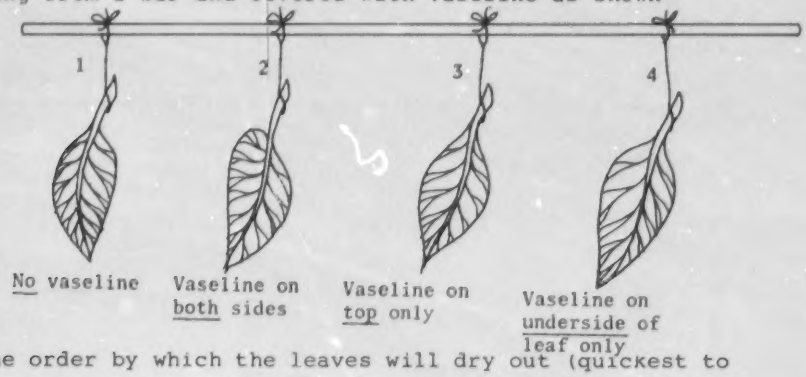
A. absorption. C. respiration.
D3 B. osmosis. D. transpiration. 241

The chlorophyll (green colouring matter) was removed from four *Geranium* leaves of approximately equal size. The leaves were then placed in an iodine solution to test for the presence of starch. After removing and washing the leaves it was observed that:
Leaf 1 had turned black
Leaf 2 had turned brown
Leaf 3 was black near large veins, brown elsewhere
Leaf 4 was brown around the edge, black elsewhere.
Which leaf contained no starch?

A. Leaf 1. B. Leaf 2. C. Leaf 3. D. Leaf 4.

B3. 242

A student set up the following experiment involving leaves hung from a bar and covered with vaseline as shown



The order by which the leaves will dry out (quickest to slowest) is

A. 1, 2, 3, 4.
B. 2, 3, 4, 1.
C. 1, 3, 4, 2.
D. 3, 1, 4, 2.

C4. 243

Stomates are small holes in leaves through which water escapes to the atmosphere.

In which of the following environments would plants probably have fewer stomates?

A. Desert.
B. Grassland.
C. Rainforest.
D. Woodland.

A4. 244

Early growth of a plant from its seed is called

A. fertilisation.
B. germination.
C. pollination.
D. photosynthesis.

B3. 245

Photosynthesis is a most important chemical change because it converts

A. the energy of carbon dioxide and water into chemical potential energy.
B. heat energy into chemical potential energy.
C. sunlight energy into chemical potential energy and returns carbon dioxide gas to the air.

D3 D. radiant energy into chemical potential energy and returns oxygen gas to the air. 246

The energy which is trapped in green plants by photosynthesis comes from the

A. ground. C. seeds.

D5 B. rain. D. sun. 247

The two raw materials a plant needs to make food are

A. oxygen and carbon dioxide.
B. oxygen and sugar.
C. water and carbon dioxide.

C3 D. water and sugar. 248

To produce its food and grow, a plant needs

A. sunlight, carbon dioxide, oxygen and minerals.
B. sunlight, carbon dioxide, water and minerals.
C. sunlight, water, oxygen and soil.

B3 D. water, carbon dioxide, minerals and soil. 249

The name given to the substance responsible for the green colouring in the leaves of plants is

A. chlorophyll. C. sap.

A5 B. phloem. D. starch. 250

Humus is decaying organic matter in the soil. This material helps plant growth by

A. providing food for the plant.
B. giving the plant roots good support.
C. providing salts for the plant.

C3 D. giving the plants plenty of water. 251

Some elements such as magnesium, calcium and phosphorus are necessary for healthy plant growth. Plants obtain these elements

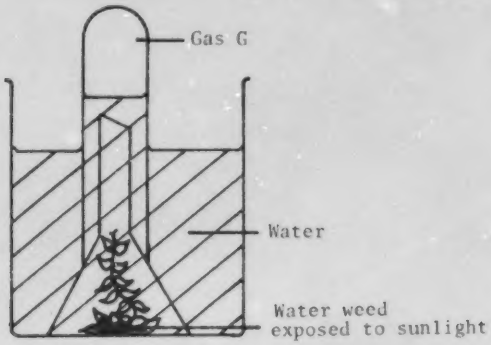
A. through the stomates.
B. through the roots.
C. in the process of photosynthesis.

B4 D. in the process of respiration. 252

Nitrogen containing compounds are often added to the soil. Plants use nitrogen compounds in the manufacture of

B1 A. fats. B. proteins. C. starch. D. sugars. 253

The next question refers to the following diagram.



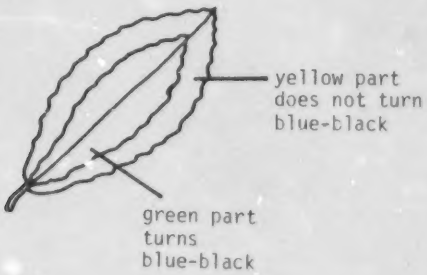
Consider the above diagram. The gas, G, would

A. cause a burning stick to "pop".
B. rekindle a glowing splint.
C. turn blue litmus red.
B2 D. turn limewater cloudy. 254

In what form do plants store food?

A. Bark. C. Starch.
C3 B. Glycogen. D. Sugar. 255

The next two questions refer to the following information.



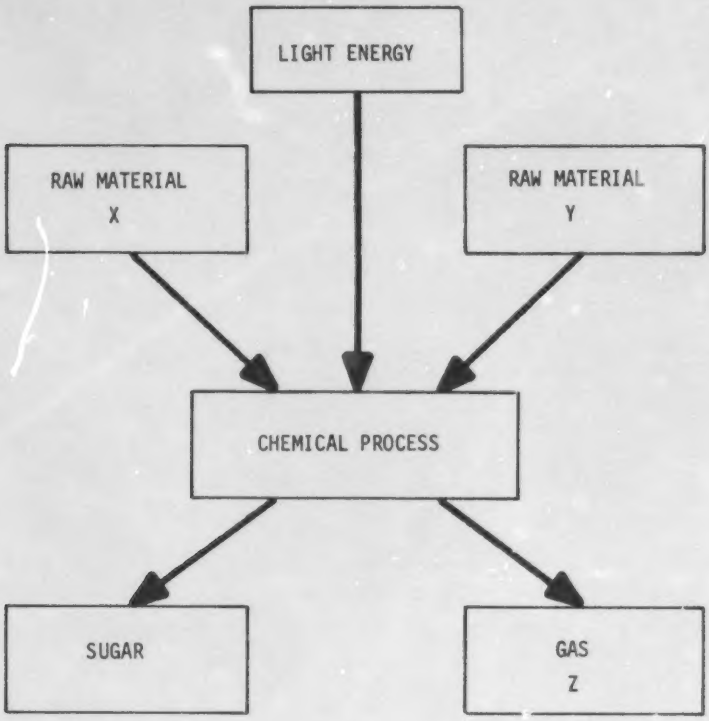
The green part of the leaf turned blue-black, but the yellow part did not. This indicates that the green part of the leaf contains

A. cellulose. C. glucose.
D4 B. protein. D. starch. 256

The result of this experiment also indicated that photosynthesis only takes place in the presence of

A. iodine. C. chlorophyll.
C1 B. sunlight. D. protein. 257

The diagram below shows how plants make their own food.



Which of these statements about the diagram is correct?

A. *X* is carbon dioxide, *Y* is water and *Z* is oxygen.
B. *X* is water, *Y* is oxygen and *Z* is carbon dioxide.
C. *X* is oxygen, *Y* is carbon dioxide and *Z* is water.
D. *X* is oxygen, *Y* is water and *Z* is carbon dioxide.

A3. 258

Which of the following must be removed from leaves before they may be tested for starch?

A. Chlorophyll. C. Iodine.
A3 B. Fibre. D. Water. 259

Before doing a starch test in Biology it is necessary to remove the chlorophyll from leaves as its green colour could disguise the positive test.
The chlorophyll is able to be removed from the leaf because of its

A. colour. C. melting point.
D3 B. density. D. solubility. 260

REPRODUCTION

The sudden development of a previously unknown characteristic in a new born individual is unusual. This phenomenon is known as

C3
A. an allele.
B. a multiple allele.
C. a mutation.
D. a chromosome.

261

Which of the following processes occurs in sexual reproduction?

A. body cells → (mitosis) sex cells → (fertilisation) zygote → embryo

B. body cells → (meiosis) sex cells → (fertilisation) zygote → embryo

C. sex cells → (fertilisation) body cells → (meiosis) zygote → embryo

B1
D. sex cells → (mitosis) zygote → (fertilisation) embryo

262

The material which probably carries the "genetic message" in living things is known by the initials

A4
A. DNA
B. FSH
C. LTH
D. RNA

263

Chromosomes have the function of

C5
A. controlling meiosis.
B. controlling mitosis.
C. carrying inherited material.
D. producing gametes.

264

When a cell undergoes meiosis

B1
A. two nucleii, identical to the original are formed.
B. new combinations of genes may occur on the chromosomes.
C. the number of chromosomes per cell is increased to its full number.
D. two different cells result.

265

In human heredity, haemophilia and red-green colour blindness are much more common in men than in women. This fact suggests that these characteristics are determined by

A. genes on the X chromosomes.
B. genes on the Y chromosomes.
C. dominant genes.
A1 D. a non-genetic factor. 266

If the adult of a species has 40 chromosomes in each cell, its fertilised egg will have

C2 A. 10 B. 20 C. 40 D. 80 267

Children of the same parents are different because

A. their body cells have different numbers of chromosomes.
B. their parents gametes have different numbers of chromosomes.
C. the process of mitosis distributes the chromosomes.
D2 D. the process of meiosis randomly distributes the chromosomes 268

All the people in the world (except identical twins) are different from one another because

A. in their lifetime men make millions and millions of sperm.
B. as we grow older our cells are constantly replacing themselves.
C. there is an almost infinite number of combinations of genes.
C3 D. mitosis never produces two cells exactly the same. 269

The gene for brown eyes (B) is dominant over the gene for blue eyes (b). If a person has brown eyes his genotype must be

A. BB. C. Bb or bb.
B5 B. BB or Bb. D. BB or bb. 270

Fraternal twins result from

A. separate development of a divided zygote.
B. two zygotes developing separately.
C. two sperm fertilising the one ovum.
B2 D. two ova being fertilised by one sperm. 271

If an animal has cells which contain 28 chromosomes, the number inherited from its mother would be

B5 A. 7 B. 14 C. 27 D. 28 272

In human heredity, lethal genes transmitted to the next generation

A. must all be recessive.
B. must all be dominant.
C. may be dominant or recessive.
C2 D. must all be sex-linked. 273

Binary fission is a method of reproduction in which the organism concerned divides in two. This method is used by

A. arthropods.
B. coelenterates.
C. molluscs.
D. protozoans.

274

Asexual reproduction differs from sexual reproduction in that it

A. involves sperm but not ova.
B. produces offspring identical to the parent.
C. is an external process.
D. only occurs in plants.

B3

275

Apple trees are usually grown by grafting a short length of apple stem onto a small apple seedling. This method is used because

A. apples do not contain seeds.
B. apple seeds will not germinate.
C. grafting is sexual reproduction which produces better fruit.
D. grafting is asexual reproduction which ensures the fruit produced by the graft is identical with the fruit produced by the parent plant.

D3

276

A biology student found that if he cut a small worm in half the tail end grew a new head and the head end grew a new tail. He also found that a starfish, if it lost an arm would grow a new one and the arm could grow into a new starfish.

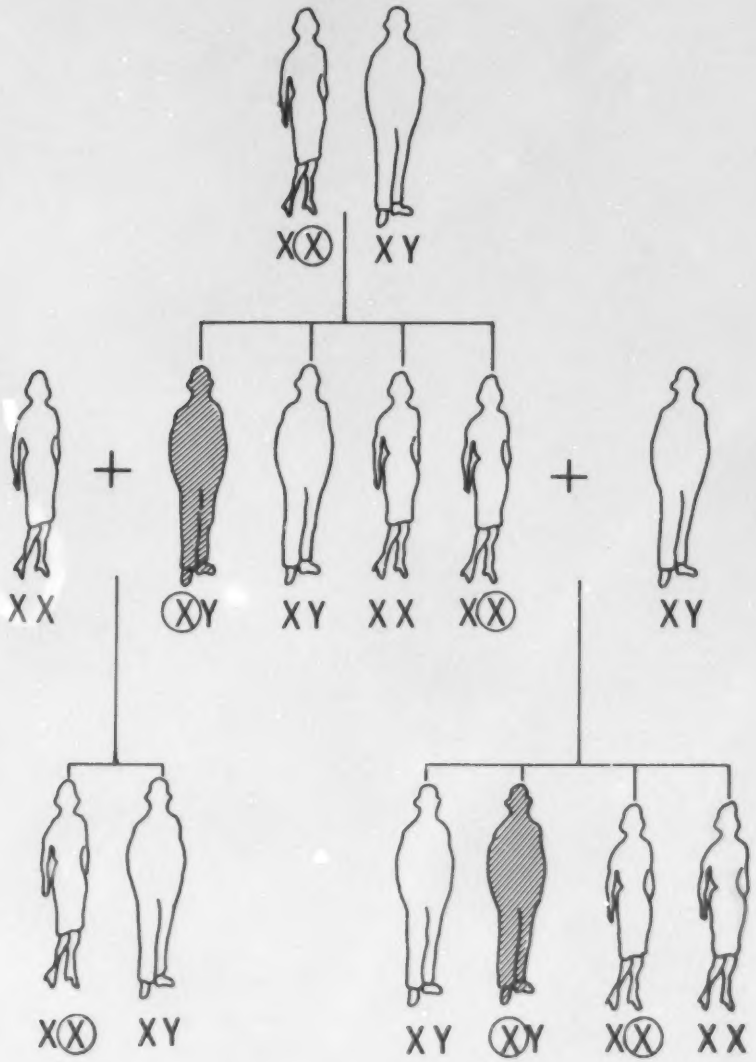
From this the student could conclude:

A. all invertebrates reproduce by dividing in half and growing new parts.
B. some animals can grow new body parts when pieces are lost.
C. worms are closely related to starfish.
D. worms and starfish can't have blood or they would have bled to death.

B.2

277

Colour-blindness is an inherited characteristic which is carried on structures called X chromosomes, and is passed on from generation to generation. The shaded figures in the diagram below have the characteristics and *are colour-blind*. The X chromosome in a circle, (X) carries the characteristic. Women with (X) are called "carriers".



From the information in the diagram you can say that

A. both men and women can be subject to colour-blindness.
B. women "carriers" pass on colour-blindness to some of their sons.
C. women "carriers" pass on colour-blindness to all their sons.
D. the daughters of "carrier" women are carriers.

B3.

In mammals, the placenta is a structure which

A. allows nutriment to pass from the blood of the mother to the blood of the foetus.
B. assists in the circulation of blood from the mother to the embryo.
C. connects the umbilical cord to the blood of the foetus.
D. stores the waste products from the foetus.

A.2 279

The next three questions refer to the following information.

In mice there are a total of 40 chromosomes in each body cell and sex determination is controlled in the same way as in man. That is, a sex chromosome complement of XY is found in normal males and the XX complement determines female characteristics.

How many chromosomes does a mouse receive from each parent.

A. 19 B. 20 C. 21 D. 40

B.3 280

How many non-sex chromosomes are normally found in the body cells of a female mouse?

A. 19 B. 20 C. 38 D. 40

C.1 281

How many non-sex chromosomes are present in a mouse gamete?

A. 18 B. 19 C. 20 D. 38

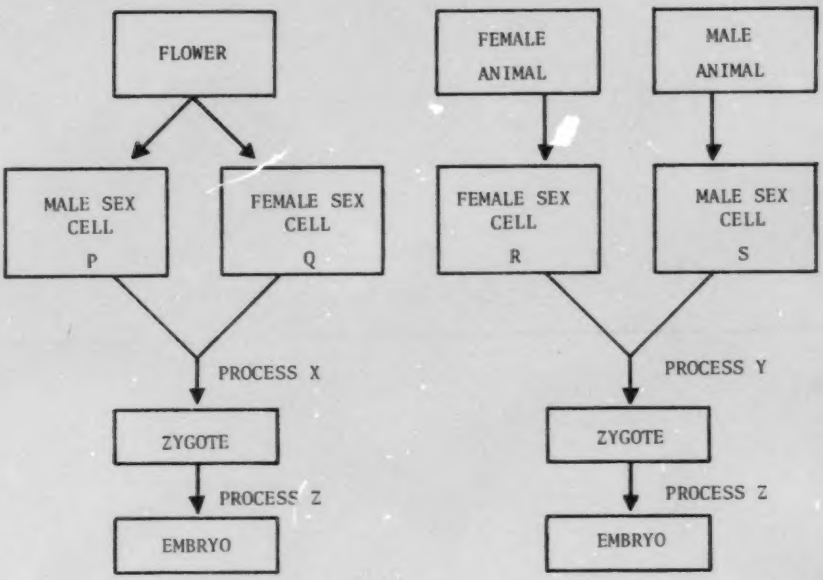
B.1 282

An orchardist may grow new apple trees by using cuttings of trees already established in his orchard. Which of the following would be true of a plant grown in this way?
The new cutting will

A. be similar to the parent plant.
B. reach maturity much faster than a plant grown from seedling.
C. tend to be more resistant to disease.
D. have a better yield of fruit than the parent plant.

A.3 283

The next two questions refer to the following information. These diagrams show part of the reproductive process for plants and animals.



Which names correctly identify the sex cells P, Q, R and S?

CELL	P	Q	R	S
A	ovule	pollen	ovum	sperm
B	pollen	ovule	ovum	sperm
C	sperm	egg	egg	sperm
D	ovum	pollen	sperm	ovum

B3 284

Process Z involves

A. growth.
B. fertilisation.
C. meiosis.
D. pollination.

A3 285

In human reproduction, the ratio of the number of chromosomes in a gamete to the number in a body cell is

A. 1 : 1
B. 1 : 2
C. 2 : 1
D. variable.

2 286

The next question refers to the table below.

GESTATION PERIODS IN MAMMALS	
MAMMAL	GESTATION PERIOD (DAYS)
Mouse	20
Rat	22
Rabbit	32
Cat	56
Dog	65
Sheep	150
Man	266
Cow	285
Horse	336
Elephant	610

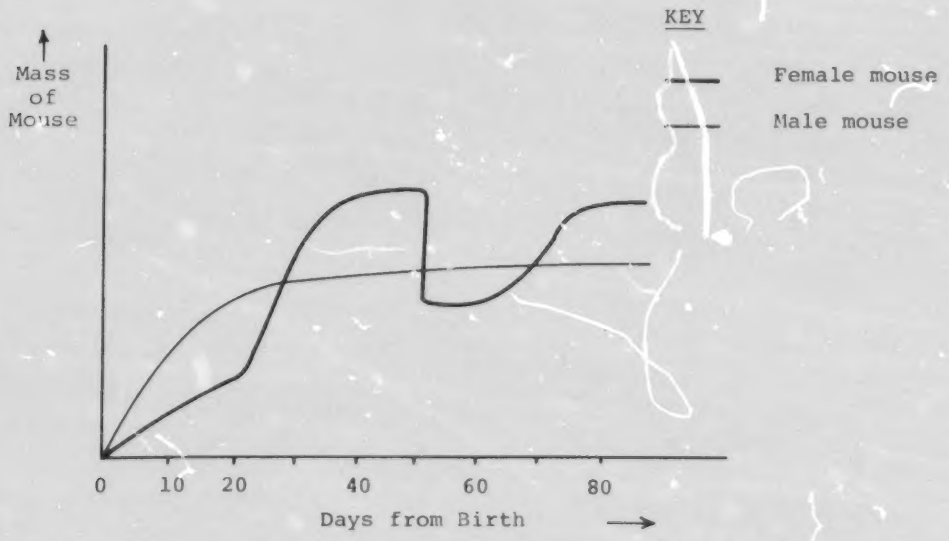
Look carefully at the table above. The best deduction you could make from this table is

A. rodents and useless animals reproduce rapidly.
B. useful animals and man take a long time to develop because they have to develop a bigger brain.
C. gestation time depends on size at birth.

C3 D. the time of development depends on the primitive nature of the animal.

287

The next question refers to the graph shown below.



The diagram above shows the changes of mass of two mice kept together in the same cage since their birth. The sudden changes in the mass of one of the mice would be best explained by

A. disease and illness.
B. injuries resulting from fights.
C. overeating.

D5 D. pregnancy and birth.

288

Fertilisation of a human ovum usually occurs in the

A3
A. Fallopian tube.
B. ovary.
C. uterus.
D. vagina.
289

In the human female, the fertilised ovum forms the

A4
A. embryo.
B. gamete.
C. oviduct.
D. placenta.
290

In human reproduction, after fertilisation the zygote develops by implanting in the wall of the

C5
A. placenta.
B. urethra.
C. uterus.
D. vagina.
291

You would expect to find amniotic fluid

A4
A. around a mammalian embryo.
B. inside the spinal cord.
C. inside a blister caused by rubbing.
D. inside hinge joints like the knee.
292

A developing foetus is well protected from its environment. Which of the following does NOT protect the foetus?

D4
A. The abdominal wall.
B. The amniotic fluid.
C. The pelvis.
D. The rib cage.
293

In human reproduction, female menstruation stops after

B5
A. childbirth.
B. conception.
C. intercourse.
D. marriage.
294

In human reproduction, the foetus is nourished through the umbilical cord which is attached to the

C4
A. aorta.
B. ovaries.
C. placenta.
D. uterus.
295

During development of the embryo in human reproduction, food is transferred from the mother to the embryo by

A. the mother's blood mixing with the embryo's blood.
B. passing from the placenta to the embryo.
C. the umbilical cord from the mother's liver to the embryo.
D. the yolk sac in the mother's ovary to the embryo.
296

Sperm and ova are made by a process called

A. fertilisation.
B. insemination.
C. meiosis.
D. mitosis.

C3 297

Intercourse involves placing the penis into the

A. cloaca.
B. urethra.
C. uterus.
D. vagina.

D5 298

In human reproduction, sperm are made in the

A. penis.
B. prostate gland.
C. seminal vesicles.
D. testes.

D3 299

In a human male, sperm cells are formed in the

A. bladder.
B. penis.
C. seminal vesicle.
D. testes.

D4 300

In human reproduction, sperm are ejaculated mixed with

A. blood.
B. mucus.
C. seminal fluid.
D. urine.

C5 301

In which part of the female reproductive system are female gametes or sex cells stored

A. Ovary.
B. Testes.
C. Uterus.
D. Vagina.

A5 302

In the menstrual cycle of the human female, the most likely time for fertilisation of the female is

A. at menstruation.
B. after ovulation.
C. just before menstruation begins.
D. just when menstruation has finished.

B3 303

Ovaries release their ripened ova into the

A. Fallopian tubes.
B. ureter.
C. uterus.
D. vagina.

A4 304

Fertilisation of an ovum by a sperm results in the formation of a

A. gamete.
B. haploid cell.
C. sex cell.
D. zygote.

D3 305

GENETICS

The next three questions refer to the following information.

Consider the following table and information.

		MALE GAMETES			
		RY	Ry	rY	ry
FEMALE GAMETES	RY	A			
	Ry		B	X	C
	rY				
	ry			D	

R = round seed
r = wrinkled seed
Y = yellow
y = green

Which offspring A, B, C or D would be a wrinkled yellow seed?

D4.

306

Offspring X would be

A. round and yellow.
B. round and green.
C. wrinkled and yellow.
D. wrinkled and green.

A3.

307

The mothers of any offspring *could* be

1. round and yellow.
2. round and green.
3. wrinkled and yellow.
4. wrinkled and green.

Which of the above are possible as mothers of offspring B?

A. 1 and 2 only.
B. 3 and 4 only.
C. 1 and 2 and 3 only.
D. 2 only.

D2.

308

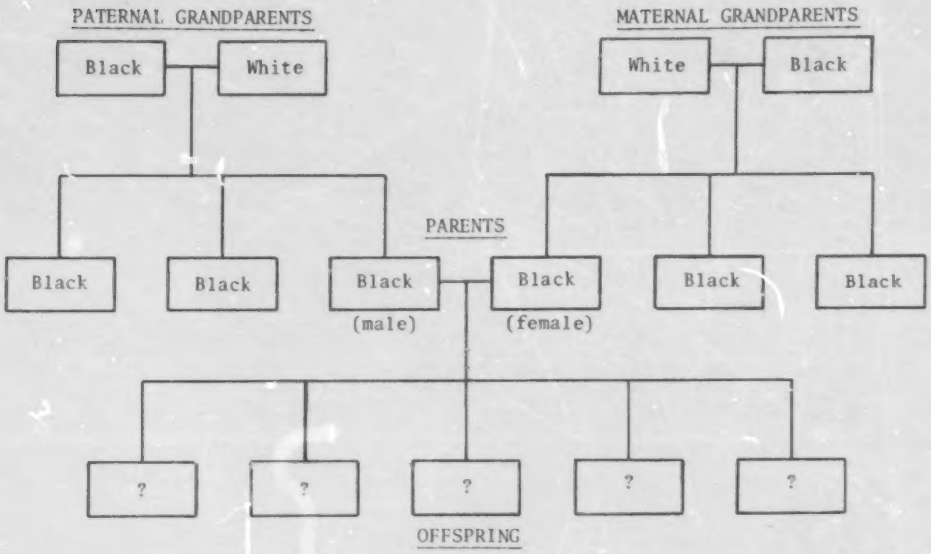
If, for a particular gene pair, parent 1 is homozygous and parent 2 is heterozygous, then the offspring of these parents will be

A. 100% homozygous.
B. 75% homozygous
C. 50% homozygous.
D. 25% homozygous.

C3.

309

The next two questions refer to the following information.



The above family tree shows the colour coat of three generations of guinea pigs. Given that the gene for black coat is dominant (B) whilst the gene for white is recessive (b), answer the following questions.

From this family tree we may deduce that, provided enough offspring were produced, then

A. all of them will be black.
B. 75% will be black and 25% will be white.
C. 50% will be black and 50% will be white.
B3 D. 25% will be black and 75% will be white. 310

From this family tree we may deduce that the female parent will

A. carry two identical genes for coat colour.
B. be heterozygous with regard to coat colour.
C. produce gametes, all of which will carry the gene for black.
B3 D. be true breeding with regard to coat colour. 311

Pollywogs can be either black or white, and it has been shown that in pollywogs black is dominant over white. Pollywogs can be *homozygous* (BB or WW) or *heterozygous* (BW).

A homozygous black male is crossed with a homozygous white female. You would expect the offspring to be

A. all white.
B. all black.
C. some black, some white.
D. some black and white, some grey.

B2. 312

When crossing tall and dwarf pea plants, various combinations are possible, especially if colour is considered as well.
Suppose T = tall G = green
t = dwarf g = yellow
And T is dominant over t.
G is dominant over g.
Which of the following offspring will be tall and yellow?

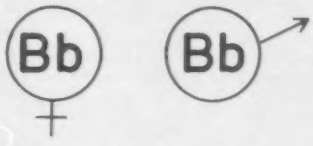
A. tTgg B. TTGG C. TtGg D. ttgG

A2. 313

Consider the sexual combination of the single gene pairs shown.

"B" refers to black colour, "b" refers to white colour.
B is dominant over b.

The parent genes are:-



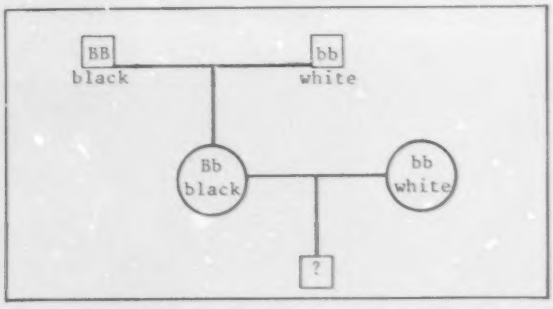
On average, four offspring would include:
2 x heterozygous black (Bb),
1 x homozygous white (bb), and

A. 1 x homozygous white (bb).
B. 1 x heterozygous white (Bb).
C. 1 x homozygous black (BB).
D. 1 x heterozygous black (Bb).

C4. 314

The next question refers to the following information and diagram.

In guinea pigs, the gene "B" for black coat is dominant over the gene "b" for white coat.
The following diagram shows the breeding tree of guinea pigs with regard to coat colour.

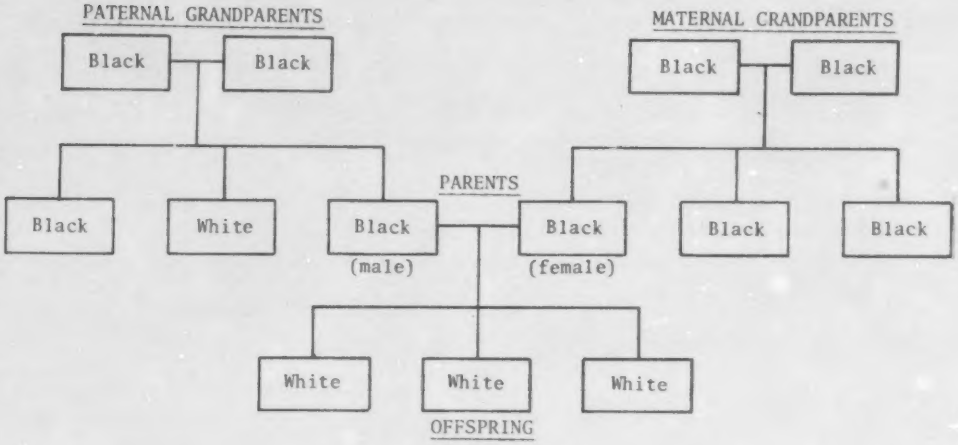


If the types circled were mated, then the proportion of black and white guinea pigs expected in a large number of offspring would be

A. all black. C. 3 black to 1 white.
B3 B. half black, half white. D. 4 black to 1 white.

315

The next five questions refer to the following information



The male parent must have the genotype

A. bb only.
C. Bb only.
C2 B. BB only.
D. BB or Bb only. 316

The female parent must have the genotype

A. bb only.
C. Bb only.
C1 B. BB only.
D. BB or Bb only. 317

The paternal grandparents must have the genotypes

A. BB and BB.
C. Bb and Bb.
C3 B. BB and Bb.
D. BB and bb. 318

The maternal grandparents must have

A. identical genotypes, both with at least one b.
B. identical genotypes, both with at least one B.
C. different genotypes, both with at least one B.
C1 D. all of the above are possible. 319

Concerning the family tree, the correct statement is

A. the maternal grandparents could never have possibly produced a white guinea pig.
B. the parents could never have possibly produced a black guinea pig.
C. the genotype of the offspring is not influenced by the genes of the grandparents.
D1 D. if two of the white offspring were to inbreed, they could not possibly produce a black guinea pig. 320

In the study of inheritance, terms are used to describe the genetic structure and appearance of individual characteristics. An organism which has identical genes for a particular characteristic would be said to have

A. homozygous phenotype.
B. heterozygous phenotype.
C. homozygous genotype.
C3 D. heterozygous genotype. 321

In genetics, the principle of incomplete dominance states that a dominant gene will produce

A. the dominant characteristic only when in the presence of a recessive gene.
B. the recessive characteristic when in the presence of a dominant gene.
C. the dominant characteristic by itself.
D2 D. an intermediate characteristic due to the influence of dominant and recessive genes. 322

The diagram above represents the full set of chromosomes from two insects. The difference is

A. a mutation has occurred in one of the sets of chromosomes.
B. they are derived from different sexes of the same species.
C. they are different species of insects.
B2 D. one is in the process of mitosis. 323

The chromosomes that determine sex are known as the X and Y chromosomes. A female has an XX and a male an XY combination. This means that the sex of the children is determined by

A. the father, because only he has the Y chromosome.
B. the mother, because she passes on the X chromosome which is dominant.
C. both parents, because one sex chromosome comes from each.
A2 D. either parent, because it is just a chance event. 324

In mice, the gene for rough coat (R) is dominant over the recessive gene for smooth coat (r). A rought-coat male was crossed with a smooth-coat female. If the male was Rr then the proportion of smooth coats to rough coats in the offspring would be

A2 A. 2:2 B. 1:3 C. 3:1 D. 4:0 325

A plant with a red flower is crossed with one with a white flower and all the offspring have pink flowers. If two pink flowered plants were crossed the offspring would

A. all be pink. C. be pink or white.
D3 B. be red or pink. D. be red, pink or white. 326

The number of chromosomes in a cell formed by mitosis is

A. twice as many as in the parent cell.
B. the same as in the parent cell.
C. half as many as in the parent cell.

B3 D. not related to the number of chromosomes in the parent cell.

327

During asexual reproduction in unicellular organisms, meiosis does not occur. As a result of this you would expect that

A. there is no chance of genetic variation occurring.
B. there is a variation in the number of chromosomes in the individual produced.
C. there is only the genetic material present in each new individual.

A1 D. the male and female cells must be contained within the one individual.

32

Identical twins result from

A. separate development of a divided zygote.
B. two zygotes developing separately.
C. two sperm fertilising one ovum.

A3 D. two ova being fertilised by one sperm.

32

The next question refers to the following information.

Consider a female cell with genes PQ, and a male cell with gene RS, as illustrated by

Which offspring in terms of gene combinations are possible should these male and female cells combine?

A. P, Q,R and S.
B. PR and QS.
C. PQ, PR, RS and QS.

D4 D. PR, PS, QR and QS.

33

A gene is a

A. molecular code on D.N.A.
B. particle within the nucleus.
C. another word for chromosome.

A1 D. another word for chromatid.

33

Chromosomes, carrying hereditary material are found in

A. cells of the nervous and muscular systems only.
B. cells in the ovaries and testes only.
C. all cells except sperm or ova.

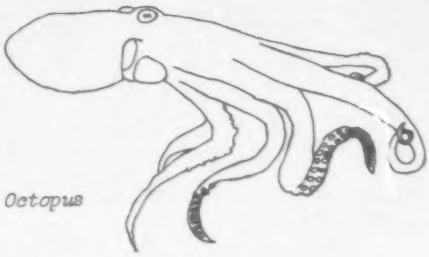
D1 D. all cells except red blood cells.

33

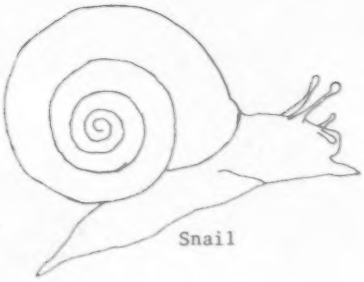
CLASSIFICATION

The four animals drawn below all belong to the group known as the molluscs.

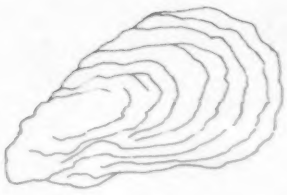
Nautilus



Octopus



Snail



Oyster

The reason they are grouped as molluscs is that they possess

A. coiled shells.
B. soft bodies.
C. paired eyes.
D. tentacles.

B.4

333

The next question refers to this table.

LEVEL	NAME OF GROUP			
Kingdom	Animalia	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Chordata	Chordata
Class	Mammalia	Mammalia	Mammalia	Mammalia
Order	Carnivora	Carnivora	Carnivora	Carnivora
Family	Felidae	Canidae	Canidae	Canidae
Genus	*Panthera*	*Canis*	*Vulpes*	*Canis*
Species	*leo*	*familiaris*	*vulpes*	*lupus*
Common Name	Lion	Dog	fox	Wolf

By using the above table which pair of animals has the most in common?

A. *Canis familiaris* and *Vulpes vulpes*.
B. *Vulpes vulpes* and *Canis lupus*.
C. *Panthera leo* and *Canis familiaris*.
D. *Canis lupus* and *Canis familiaris*.

D2. 334

LEVEL	NAME OF GROUP			
KINGDOM	ANIMALIA	ANIMALIA	ANIMALIA	ANIMALIA
PHYLUM	CHORDATA	CHORDATA	CHORDATA	CHORDATA
CLASS	MAMMALIA	MAMMALIA	MAMMALIA	MAMMALIA
ORDER	CARNIVORA	CARNIVORA	CARNIVORA	CARNIVORA
FAMILY	FELIDAE	CANIDAE	CANIDAE	CANIDAE
GENUS	*Panthera*	*Canis*	*Vulpes*	*Canis*
SPECIES	*leo*	*familiaris*	*vulpes*	*lupus*
COMMON NAME	LION	DOG	FOX	WOLF

By using the above table which pair of animals has the most in common?

A. Dog and fox.
B. Fox and wolf.
C. Lion and dog.
D. Wolf and dog.

D4. 335

The next 6 questions refer to the table below.

<table>
<tr><td rowspan="2">CHARACTERISTIC</td><td colspan="5">GROUPS</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Appearance of skin</td><td>covered with feathers</td><td>covered with hair or fur</td><td>dry and scaly</td><td>wet and naked</td><td>scaly</td></tr>
<tr><td>Organ used for breathing</td><td colspan="3">lungs</td><td>gills for larvae
lungs for adults</td><td>gills</td></tr>
<tr><td rowspan="2">Usual method of reproduction</td><td>females lay hard-shelled eggs</td><td>females bear live young</td><td>females lay soft-shelled eggs</td><td colspan="2">females lay fragile eggs with no shells</td></tr>
<tr><td colspan="3">eggs are fertilized inside females before laying</td><td colspan="2">eggs are fertilized in water after laying</td></tr>
<tr><td>Care of young</td><td>young are fed until they can fly</td><td>young are suckled</td><td colspan="3">young find their own food</td></tr>
<tr><td>Adaptations for movement</td><td colspan="4">limbs evolved from fins
forelimbs of birds modified for flight</td><td>fins for swimming</td></tr>
</table>

Which group would best be called reptiles?

A. 1 B. 2 C. 3 D. 4

C5. 33

In which group do only the young animals live in water?

A. 1 B. 2 C. 3 D. 4

D5. 33

Which animal below would belong to group 2?

A. Emu. B. Lizard. C. Platypus D. Spider.

C4. 33

Which groups of animals are warm-blooded?

A. 1 & 2 B. 3 & 4 C. 4 & 5 D. 2 & 4

A5. 33

Which group of animals is lowest on the evolutionary scale ?

A. 2 B. 3 C. 4 D. 5

D3. 34

To which group would a whale belong?

A. 1 B. 2 C. 3 D. 4

B2. 34

The next question refers to this table.

	1	2	3	4	5
Body	mostly in two parts	in two parts	in three parts	many flat segments	many round segments
Number of legs	commonly ten	eight	six	one pair per segment	two pairs per segment
Method of breathing	gills	book lungs	tubes in body called tracheae		

The animal groups listed in the table probably belong to phylum

A. Mollusca.
B. Echinodermata.
C. Arthropoda.
D. Chordata.

C3. 342

One of the most obvious differences between land plants and animals is that plants are fixed while most animals can move.

Plants do not have to move because they

A. are not preyed upon by other organisms.
B. grow so large.
C. do not need to obtain water.
D. carry out photosynthesis.

D4. 343

A party of zoologists travelling in South America discovered an animal which they named the "Sloth". Apart from being a very slow moving animal, they discovered it had the following characteristics:

1. a skin covering of hair;
2. gave birth to its young alive (viviparous);
3. warm-blooded;
4. breathed by means of lungs.

From these characteristics the zoologists were able to classify it as

A. an amphibian.
B. a fish.
C. a mammal.
D. a reptile

C5. 344

The next question refers to the information below.

	1	2	3	4	5
Body	mostly in two parts	in two parts	in three parts	many flat segments	many round segments
Number of legs	commonly ten	eight	six	one pair per segment	two pairs per segment
Method of breathing	gills	book lungs	tubes in body called tracheae		

The animals in group 1 are probably

A. centipedes.
B. crustaceans.
C. insects.
D. millipedes.

D2.

345

A scientist studies five very different plants and records his observations on the table below.

PLANT	FOOD & WATER CONDUCTING TISSUE	HEIGHT	METHOD OF REPRODUCTION	HABITAT	LEAVES
ALGAE	NO	1m	FREE SWIMMING SEX CELLS	SEA	NO
MOSS	NO	0.005m	SPORES	LAND	NO
LIVERWORT	NO	0.001m	SPORES	LAND	NO
FERN	YES	1m	SPORE	LAND	YES
GUM TREE	YES	7m	SEEDS	LAND	YES

The best explanation for the shortness of mosses and liverworts is

A. the absence of food and water conducting tissue.
B. method of reproduction.
C. habitat.
D. the absence of leaves.

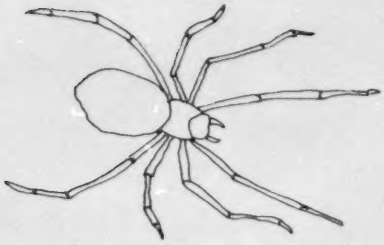
A3

346

The four animals drawn below belong to the group known as the arthropods.

Crayfish

Ant



Spider

Centipede

The reason they are grouped as arthropods is that they possess

A. hard, outer coverings.
B. segmented bodies.
C. several pairs of legs.
D1 D. jointed legs.

347

A scientist discovers a new species of animal with the following characteristics:

i. contains a vertebral column.
ii. lays eggs in the sea.
iii. spends some of its time on land.
iv. breathes by means of lungs.
v. has a smooth skin partially covered with hair.

This new species of animal is most likely

A. an amphibian.
B. a reptile.
C. a mammal.
C2 D. a fish.

348

An amoeba moves by means of

A. cilia.
B. flagella.
C. jointed limbs.
D. pseudopodia.

D1

349

Moss plants are never more than about 2 cm high. This is mainly because moss

A. lacks conducting tissue.
B. photosynthesises slowly.
C. need organic matter for food.
D. respires very quickly.

A1

350

Which of the following groups of organisms can be saprophytic or parasitic?

A. Gymnosperms.
B. Mosses.
C. Fungi.
D. Angiosperms.

C1

351

Biologists speak of insects as being a highly successful group of animals. The main reason for this is that

A. insects have a more complex life cycle than the simple animals.
B. insects have the highest rate of reproduction.
C. they are adapted to more environments than other animals.
D. they survive successfully with man.

C2

352

The classification of living things involves arranging them into groups based on similarities. The smaller the group, the more similar are the members of that group. Which of the following groups contains members with the greatest similarity?

A. Phylum.
B. Family.
C. Class.
D. Genus.

D1

353

Which of the following is a characteristic of mammals only?

A. Having teeth.
B. Having hair or fur.
C. Having a spinal column.
D. Being warm-blooded.

B3

354

Man and apes are both classified as primates because of

A. hair covering the body.
B. the size of the skull.
C. opposable thumbs.
D. the presence of a placenta.

C1

355

Which of the following sequences is in the correct order from the group containing the largest number of organisms to the group containing the smallest number of organisms?

A. Class, genus, family, order, phylum.
B. Family, phylum, order, class, genus.
C. Phylum, class, order, family, genus.
D. Phylum, family, order, genus, class.

C1

356

The next three questions refer to the following information.

The table below lists the characteristics of five species of plants.

	P	Q	R	S	T
normal habitat	aquatic	land	land	land	aquatic
vascular tissue present	yes	yes	yes	no	no
produces flowers	yes	no	yes	no	no
produces cones	no	yes	no	no	no
produces seed	yes	yes	yes	no	no
manufactures own food	yes	yes	yes	no	yes

The species which are most likely to be included in the angiosperm group are

A. P, Q and R
B. P and R.
C. Q, R and S.
D. R and T.

B.1 357

The species which is most likely to be a fungus is

A. P B. Q C. S D. T

C.1 358

The species which is most likely to be a gymnosperm is

A. P B. Q C. R D. S

B.1 359

The next four questions refer to the following table.

	1	2	3	4	5
Examples	*Amoeba* *Euglena*	jellyfish coral sea anemone bluebottle			crustaceans spiders insects
Description	Single-celled Aquatic	many-celled			
		soft hollow body with tentacles for catching food mostly marine	flat or cylindrical muscular body some segmented	soft continuous body usually with a shell	body in 2 or more parts with a strong outer skeleton
Digestion	within the cell	in a 'gut' with one opening, the mouth	in a gut continuous from mouth to anus. (The flatworms are exceptions).		
Arrangements of cells in body wall	no body wall	body wall has two layers of cells	body wall has three layers of cell.		
		layers separated by jelly	middle layer is the body cavity or coelum. The coelum carried the organs of the body. (Flatworms have no true body cavity).		

Which group is collectively called the coelenterates?

A. 1 B. 2 C. 4 D. 5 360

Into which group would a prawn be grouped?

D1 A. 1 B. 2 C. 4 D. 5 361

One group contains animals which move by contractions of a large muscular foot. Which group contains these animals?

C1 A. 2 B. 3 C. 4 D. 5 362

Which group has a reproductive process which is completely different from that of other groups?

A3 A. 1 B. 2 C. 3 D. 4 363

ECOLOGY

On the coast of Australia's tropical north, mangrove trees retain sediments about their root system, gradually raising the level of the land. If there is adequate rainfall, the mangroves are gradually replaced by ti-tree, which finally may be largely replaced by *Eucalyptus* and *Acacia*.

The description above is an example of

A. conservation.
B. succession.
C. deposition.
D. dominance.

B2. 364

Plant successions usually proceed from small to large plants. For example, from grasses to bushes to trees.

Which of the following habitats is different in that its succession of plants starts with trees?

A. Mangrove swamp.
B. Freshwater creek.
C. Sandstone rock.
D. Inland lake.

A3. 365

Which plant would be most useful to start a plant succession on sand hills rendered barren by beach mining?

A. *Acacia* shrubs.
B. *Banksia* bushes.
C. *Eucalyptus* trees.
D. *Spinifex* grass.

D3. 366

A number of fish is added to those already in a fish pond. In this pond the water weeds and fish had formed a well balanced community and there was no build-up of any waste materials. The new fish are likely to

1. reduce the available oxygen in the pond.
2. provide more carbon dioxide for the plants.
3. reduce the freedom of movement of the fish.

Which of the above statements are true?

A. 1 and 2 only.
B. 1 and 3 only.
C. 2 and 3 only.
D. 1, 2 and 3.

D2. 367

A number of fish is added to those already in a fish pond, in which the water weeds and fish formed a well balanced community and there was no build up of any excretory material. The addition of the new fish is likely to

A. reduce the available oxygen in the pond only.
B. provide more carbon dioxide for photosynthesis only.
C. reduce the freedom of movement of all the fish only.
D cause all of the above to happen at the same time.

D4. 368

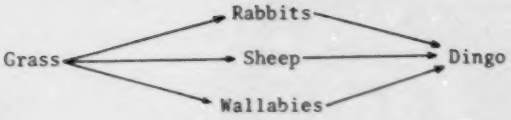
A layer of leaf litter generally remains much the same thickness beneath trees even though leaves are continually falling. This is due to the leaf litter being

A. consumed (eaten) by small organisms.
B. compacted as more material falls.
C. pushed down into the soft soil.
A2 D. used by birds for nest-building. 369

A writer describes a food chain in the following way. 'A butterfly in search of nectar is devoured by a dragonfly, which is snapped up by a bull frog. The bull frog is eaten whole by a water snake, which in turn is eaten by a hawk. Here the food chain ends, as the hawk has no predator but man.' The writer is not accurate in saying 'here the food chain ends' because

A. the hawk will be eaten by the man.
B. the hawk eats mice as well as snakes.
C. the hawk will be acted upon by decomposers.
D. this food chain did not start with a producer.

C.3 370



The above diagram shows part of the food web for sheep breeding areas of Australia.

A possible conclusion from this is that

A. total eradication of the dingo may create further problems.
B. without rabbits the dingo would die.
C. the dingo should be allowed to increase in numbers.
D. sheep are the main food source for dingoes.

A4. 37

A pupil placed a piece of bread under an iron sheet that was lying on the ground. One day later the pupil returned to the spot and found that the sheet of iron was undisturbed but the bread had gone. The most likely explanation for the disappearance of the bread was that it

A. had been decomposed by bacteria or fungi.
B. was removed by consumer organisms.
C. dissolved into the soil under the iron.
D. had been washed away by water.

B.3 37

Look carefully at the cartoon above. In terms of the food cycle such birds would be regarded as

A. carnivores.
B. herbivores.
C. producers.
D. regenerators.

A3 373

Which of the following diagrams represents a cycle that occurs in nature?

A. Plants → Plant eating animal → Carnivore

B. Aluminium can → Aluminium metal → Aluminium can

C. Carbon dioxide in the air → (Photosynthesis) Glucose in plants → (Respiration) Carbon dioxide in the air

C3 D. Food eaten → (Digestion) Glucose → (Assimilation) Part of an animal cell

374

A water weed is growing in a lake and it is feared that it will eventually clog the intake pipes of a power house which uses water from the lake. Below are some steps that could be taken towards a permanent solution to the problem of the weed. Which do you think would be the best step to take first?

A. Drain the lake completely.
B. Add large quantities of weed poison to the lake.
C. Make a study of the life cycle of the weed.
C4 D. Add a new type of fish to the lake.

375

If we could weigh all the organisms of a grassland community, the type of organism with the greatest total mass would be that which obtains its energy from

A. sunlight.
B. plants.
C. animals.
D. plants and animals.

A2 376

The next two questions refer to the diagram below.

If the supply of frogs happened to decrease in numbers then the supply of grasshoppers should

A. also decrease in numbers.
B. then increase in numbers.
C. remain the same in number.
D. then be eaten by eagles.

B.4 377

Man has hunted the eagle and it is considered to be decreasing at an alarming rate. What main effect would this have on the other animals, according to the diagram?

A. The snakes and frogs would decrease also in number.
B. Only the grasshopper would decrease in number.
C. The frogs would decrease, thus causing an increase in grasshopper numbers.
D. Only the snakes would decrease.

C.3 378

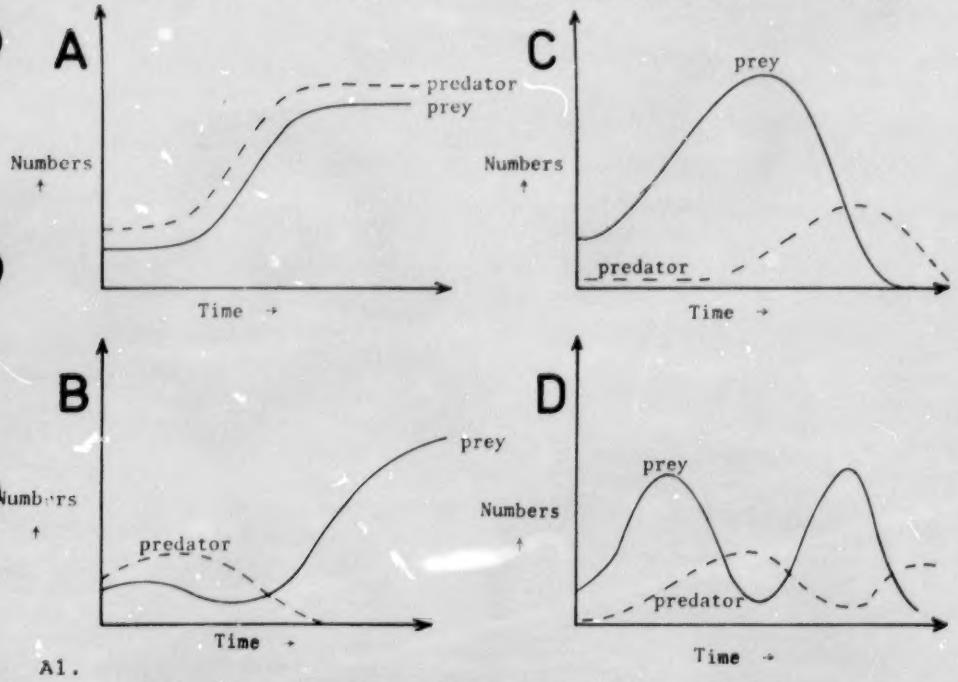
The best definition of a predator would be an animal which

A. is eaten by other animals.
B. eats grass only.
C. eats other animals.
D. eats vegetation only.

C4. 379

A fish tank was set up with large numbers of 2 kinds of microscopic organisms in it. One of these, the predator, fed on the other organism, the prey.
The numbers of each type of organism were counted each day and a graph of the numbers was drawn against time.

Of the following which is the <u>least likely</u> to be the graph drawn?



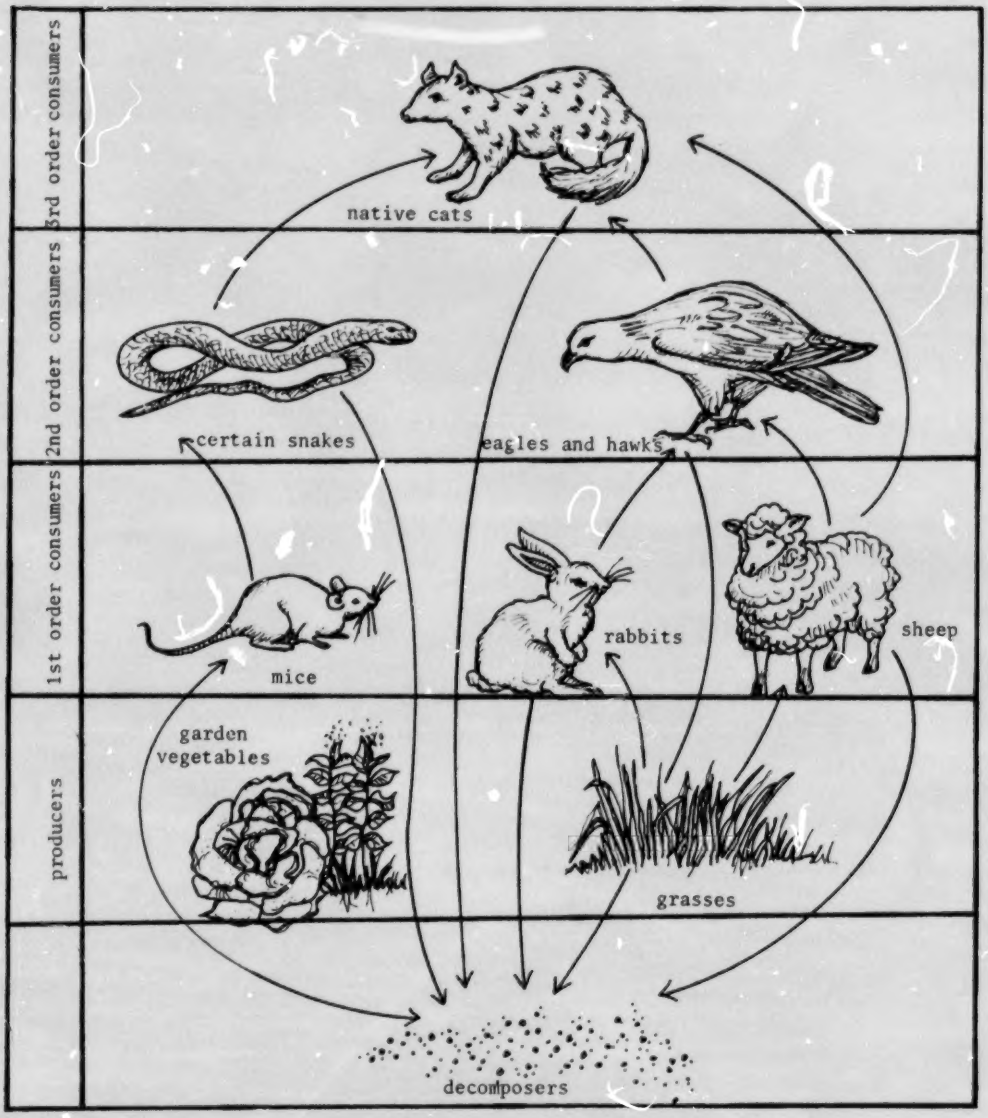
A1. 380

A change in the size of a population is determined by three variables : the number of births, the number of deaths, and the balance of migration.
Thus, if b = birth rate,
d = death rate,
i = immigration rate,
e = emigration rate, then the overall rate of change (increase or decrease) in a given period is best represented by the formula:

A. (b + i) - (d + e)
B. (b + i) + (d + e)
C. b - d
D. b + d

A3. 381

The next five questions refer to the following diagram of a food web.



The questions referring to this diagram appear on the next page.

The questions on this page refer to the diagram on the previous page.

One of the following groups contains decomposer organisms only. Which one?

A. bacteria, fungi.
B. native cats, bacteria.
C. flies, native cats.
D. fungi, mosses.

A.3 382

If all the snakes were killed by a disease, which organisms would initially increase in numbers according to this food web?

A. rabbits.
B. mice.
C. vegetables.
D. hawks.

B.5 383

According to this food web, if hawks and eagles began to eat mice instead of sheep, what effect would this have on the abundance of snakes?

A. increase.
B. decrease.
C. no change.
D. insufficient information.

B.4 384

According to this food web, which organism has the most varied diet?

A. snakes.
B. vegetables.
C. eagles.
D. native cats.

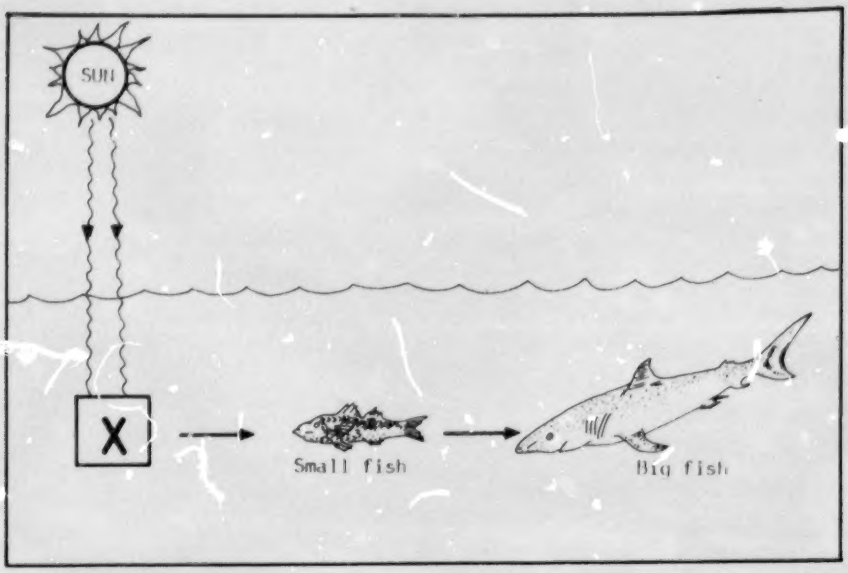
D.4 385

Native cats are classified as 3rd order consumers on this food web. They could also be classified as 2nd order consumers because they eat

A. snakes.
B. eagles.
C. sheep.
D. hawks.

C.3 386

The diagram below represents the pathway (food chain) by which energy from the Sun can become energy used by a large fish.



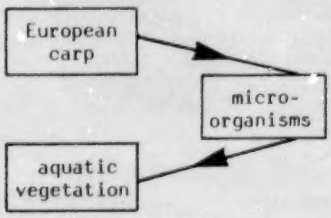
You would expect X to be a

B5
A. very small fish.
B. plant.
C. water molecule.
D. shellfish.

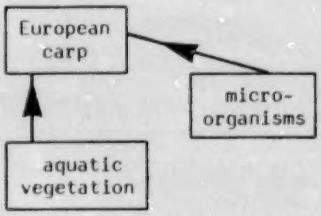
387

If the micro-organisms in the diet of the European carp only feed on living and dead aquatic vegetation, which of the following best shows the food web involving the European carp?

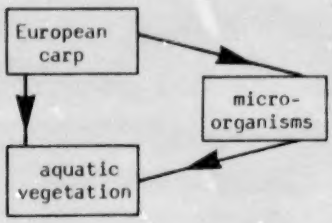
A.



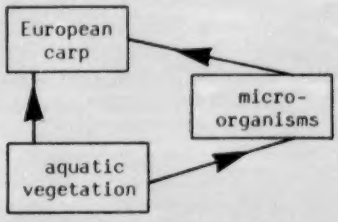
C.



B.



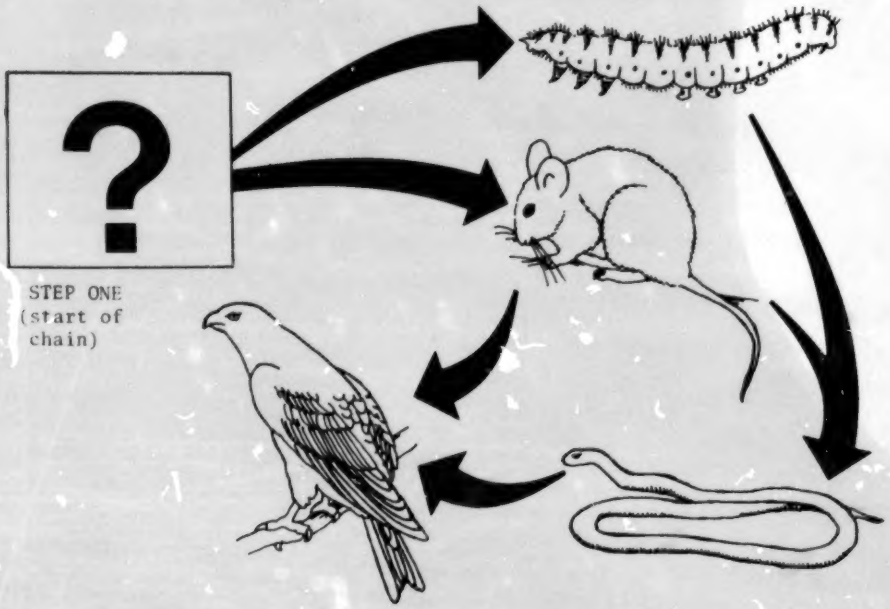
D.



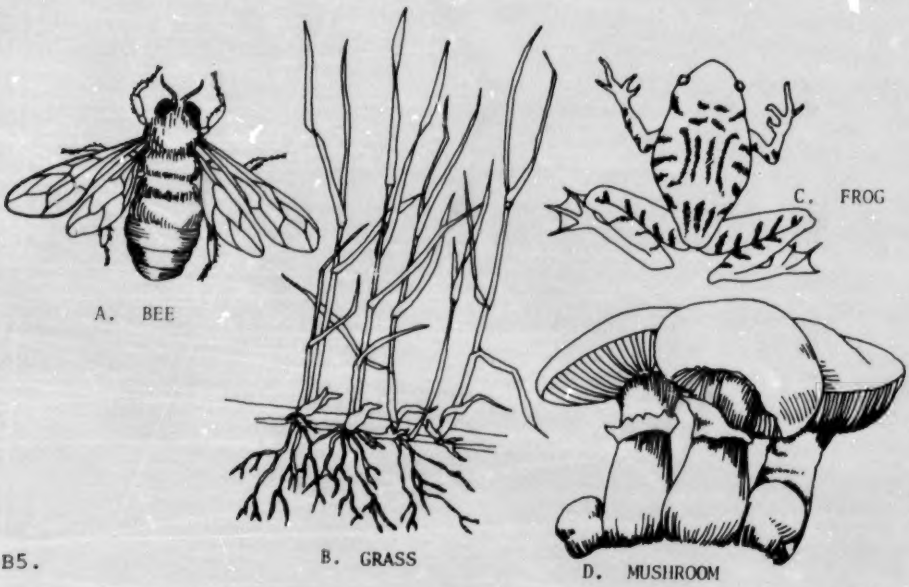
D1

388

The diagram below is a partly completed food chain.



Of the organisms shown below pick out the one which best fits into the empty square.



B5.

389

Organisms may be grouped as either consumers or producers. Which of the following organisms is a consumer?

C2

A. Alga
B. Fern
C. Fungus
D. Moss

390

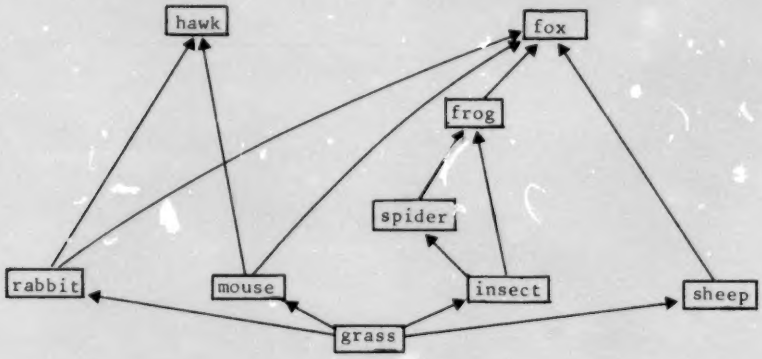
The next question refers to the following diagram.

The diagram above represents a typical food chain. Which of the following organisms would best fit into the vacant rectangle?

A5
A. eagle.
B. flower.
C. parrot.
D. sheep.

391

Use the following diagram to answer the next three questions.



An example of a herbivore would be a

C5
A. fox.
B. frog.
C. mouse.
D. spider.

392

An example of an animal in the above food web which eats both herbivores and other carnivores would be a

A3
A. frog.
B. hawk.
C. rabbit.
D. spider.

393

If all the frogs were killed, this would change the numbers of animals

D3
A. which eat frogs.
B. which are eaten by frogs.
C. which eat or are eaten by frogs.
D. in every part of the food web.

394

In a leaf litter community, the <u>original</u> source of the energy used by carnivores comes from

D3
A. leaf litter.
B. leaf litter feeders.
C. living leaves.
D. sunlight.

395

Biological control of a pest means using another animal or plant to kill it. This means that the controlling species is not native to the area and must be introduced. The main reason why biological control is used in many cases is that

A. if used correctly the controlling species attacks only the pest species.
B. not all of the pest species will be killed.
C. no damage is done to the rest of the environment.
D. it works more quickly than poisonous chemicals.

C2. 396

Small amounts of sewage getting into streams or rivers are readily decomposed by bacteria, but large amounts soon pollute the water and kill the organisms in it. This is because

A. waste materials such as sewage are very poisonous.
B. the water is discoloured and no plants can grow.
C. the bacteria are too few to decompose the sewage.
D. the bacteria breed quickly and use up all the oxygen.

D2 397

In using "biological control" to reduce the damage caused by a pest, the controlling organism should be very carefully studied to make sure that it

A. only kills that one pest.
B. reproduces very rapidly.
C. cannot fly to other areas.
D. has a short life span.

A.3 398

Erosion is partly due to the influence of the rabbit. Although the rabbit has caused very little damage in its native country, it has caused much damage in Australia.

This is probably because

A. Australian soil is poorly held together.
B. rabbits in Australia have evolved different burrowing habits.
C. plants in Australia are more easily destroyed by rabbits than plants in other countries.
D. with plenty of food and no predators in Australia they multiplied very quickly.

D3. 399

In the oxygen cycle, oxygen gas returns to the atmosphere as a product of

A. burning fuels.
B. oxidation.
C. photosynthesis.
D. respiration.

C1 400

One often reads in the press that fish in various areas contain a high mercury contamination as a result of industrial pollution.

The real danger, as a result of pollution of this type, is

A. shortage of food as some fish will die.
B. mercury poisoning in people who eat the fish.
C. an upsetting of the natural balance in the area.
D. the loss of a particular species of fish due to pollution.

B3. 401

Fact 1. Gases are less soluble in hot water.
Fact 2. Animals require oxygen to live.

When considered together, these two apparently unrelated statements explain why

A. many organisms die when hot water from industry is poured into rivers.
B. Queensland lungfish have lungs.
C. on hot days we feel very tired and listless.
D. Coca-Cola fizzes less if it has been chilled before being opened.

A3. 402

Modern biology is relying more and more on the biological control of pests rather than spraying or baiting.

The term biological control means that the pest is being controlled by

A. an animal that preys on it.
B. injections of special drugs.
C. burning forests where the pests live.
D. shooting with special paralysing darts.

A3. 403

Refer to the table below which shows the death rate for mosquitoes, flies and spiders which resulted from using equal quantities of four different pesticides A, B, C and D.

Pesticide	Mosquitoes	Flies	Spiders
A	100%	90%	10%
B	40%	40%	40%
C	70%	80%	70%
D	20%	20%	90%

In your opinion, which of the pesticides A, B, C and D would be the best <u>all purpose</u> spray?

C5. 404

An insecticide spray, D.D.D. was used to kill gnat larvae living under water in a lake. Over a period of years it was found that the colony of fish-eating birds living on the lake was beginning to decrease in numbers because of D.D.D. poisoning. In the lake there lived insect larvae, plants and fish as well as birds. The most likely pathway for D.D.D. to enter the birds is

(——→ means is eaten by)

A. plants ——→ insect larvae ——→ fish ——→ bird.

B. insect larvae ——→ plants ——→ birds ——→ fish.

C. plants ——→ fish ——→ insect larvae ——→ birds.

D. insect larvae ——→ birds ——→ fish ——→ gnats.

B4. 405

The use of DDT has been restricted in the United States. The reason for this is that DDT is

A. poisonous.
B. a cumulative poison and may affect man.
C. no longer effective on insects.
D. being replaced by more effective pesticides.

B3. 406

Through scientific research we are able to produce more food. The most likely effect of this would be

A. decrease in animal life.
B. increase in people farming.
C. increase in human population.
D. decrease in family size.

C2. 407

As a result of his study of plant nutrition man now applies fertilizers to his crops.

The reason he does this is to

A. kill harmful bacteria.
B. make the plants grow taller.
C. prevent excessive weed growth.
D. put minerals back into the soil.

D3. 408

Which of the following pairs of processes are the most important contributors to the cycles which keep the percentage of gases in our atmosphere at a constant level?

A. Respiration and decay.
B. Photosynthesis and assimilation.
C. Assimilation and excretion.
D. Photosynthesis and respiration.

D3. 409

Many people feel that as Australia's industries expand, special care should be taken to see that the Australian wild life is preserved in its natural state.

Which one of the following proposals do you think would be the most sensible way to do this?

A. Place a total ban on the chopping down of Australian trees, and the clearing of bushland.
B. Develop large zoological parks which could be stocked with breeding pairs of each species of kangaroo.
C. Set aside certain areas of natural bushland to be reserved for the breeding of birds and other wildlife.

C4 D. Prevent mining companies searching for minerals in areas where wildlife is known to be breeding. 410

The centre of a heap of rotting lawn clippings or compost heap often feels quite hot because

A. compression from the weight of the material on top causes heating.
B. the sun's rays on hot days causes the water in the dead grass to heat up.
C. the decomposers trap the sun's energy and convert it to food and heat.
D1 D. heat is released in respiration by decomposers.

411

The feral cat is a cat which has been released from domestication to freedom in the bush. This is of great concern to, and presents a problem to, the National Parks services in Australia because

A. this leads to large populations of predators.
B. there is an upset of the balance of life within the natural ecosystem.
C. National Parks tend to become rather like oversize cages.
B2 D. animals released into nature are subjected to cruelty as a result of the actions of more ferocious animals.

412

Poplars are decorative trees which make good wind breaks and are also used in Australia for making matches. Rust is a fungus disease which has been found to attack poplars in Europe and America but not in Australia before 1972. In 1967 seed was imported from America by the CSIRO and cuttings from these plants grown from seed were planted to select best varieties at Upper Colo, Sydney in 1969. In 1972 the leaves of some of these latter plants were covered with rust. Within six weeks of its appearance at Upper Colo, it was reported to have appeared on poplars in Canberra, Tumut and Grafton.

The most probable reason for the appearance of rust in Australia was

A. air movements brought the rust from the northern hemisphere.
B. an importer brought the rust in on an infected poplar cutting.
C. rust is produced as a result of a mutation of a gene in poplar seeds.
A2 D. poplars infected with the disease were growing on soil derived from ironstone.

413

Australia has a small native dung beetle. It has been found necessary, however, to introduce dung beetles from overseas. The main reason for this is that

A. there are more animals in Australia now than there were a few years ago.
B. introduced species such as cattle, produce larger dung pats than native species.
C. native dung beetles died out since the settlement of Australia.
B1 D. native dung beetles do not like the pats of introduced species.

414

The next question refers to this information.

The San Diablo Valley in California was a rich farming area where the main "crop" was cattle. There were coyotes in the valley which lived mainly on small rodents (rat-like plant-eating animals). The coyotes also killed and ate an occasional calf, so the ranchers laid baits and destroyed the whole coyote population.

Two years later, there was almost no life left in the San Diablo Valley. "It's just like a waste land" said one rancher". "I guess we've learned our lesson the hard way" said another.

The factor relating the coyote poisoning to the damage to the valley would be the

A. destruction of the plant life by drought.
B. clearing of the land for pastures.
C. decreasing number of calves dying.
D. large increase in the number of rodents.

D3. 415

AN ALTERNATIVE FORM APPEARS BELOW

In a valley in lower California, ranchers poisoned off all the coyotes, (animals which usually feed on small rodents) because they took an occasional calf. Since the extermination of the coyotes the valley, once containing rich grasslands, has become denuded of vegetation and is now a waste land. The most likely factor associated with the disappearance of the coyotes and the denudation of the land is

A. destruction of the vegetation by drought.
B. clearing of the land for pastures.
C. decreasing numbers of calves dying.
D. a large increase in the number of rodents.

D3. 416

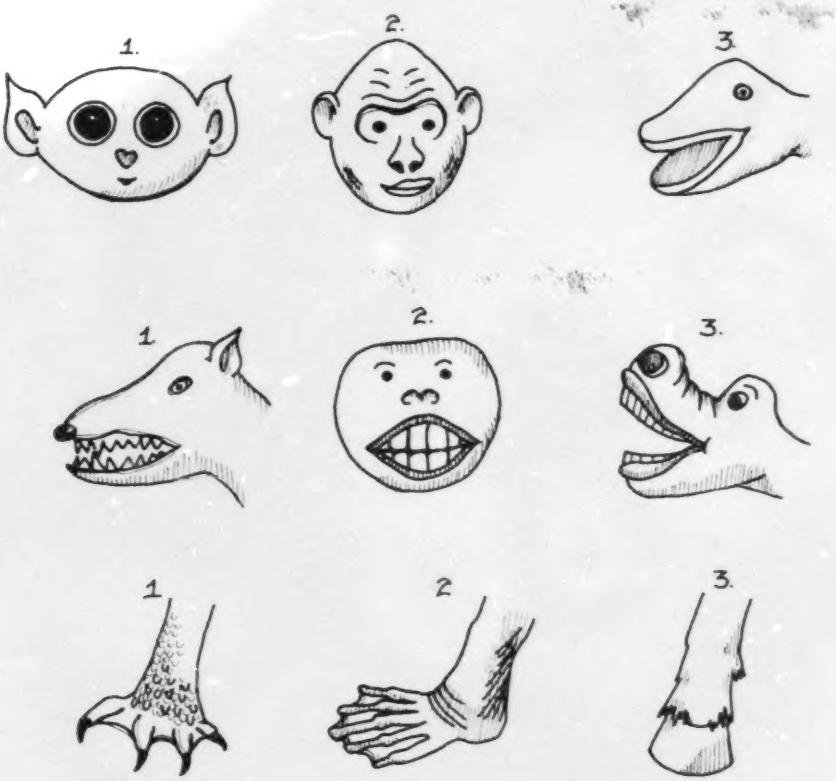
CAUTION:

THE QUESTIONS ON THIS PAGE

ARE *ALTERNATIVES*.

ADAPTATIONS

The next 2 questions refer to these diagrams.



Which combination would best suit a tree-dwelling, nocturnal, vegetarian?

A. Eyes 1, teeth 2, feet 3.
B. Eyes 2, teeth 2, feet 2.
C. Eyes 3, teeth 1, feet 1.
D. Eyes 1, teeth 3, feet 1.

D3

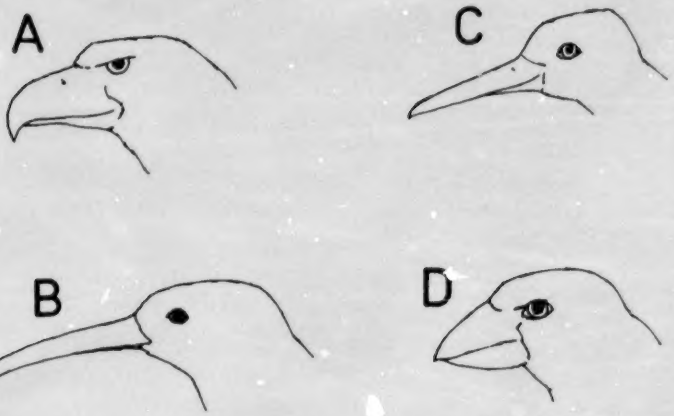
417

An animal which had
eyes 3, teeth 1, feet 2
would be best adapted to live in

A. desert.
B. mountains.
C. sea.
D. underground.

C4.

418



Which of the birds shown above would you expect to live mainly on a diet of seeds?

D5. 419

Larger animals can be found in the sea than have ever lived on land because

A. there is more sea than land.
B. marine animals are supported by the water.
C. there are more plants in the sea than on land.
D. marine animals have no problem getting enough water.

420

A group of animals is said to be "well-adapted". This statement means that

A. individual animals from the group can survive in a wide variety of environments.
B. in times of drought or other hardship, only the most healthy individuals in the group will survive.
C. the strongest individuals in the group are more likely to breed strong youngsters than the weaker individuals.
D. the animals in the group are better able to survive the conditions of their environment than any other group.

421

Small animals living in brown sandy deserts are usually brown. The best explanation is that

A. the animals feel the need to be brown to protect themselves.
B. chemicals from the sand soak into them and make them brown.
C. brown animals are not as easily captured by carnivores.
D. the brown coats absorb less heat.

422

A snake is a *poikilothermic* animal. The term *poikilothermic* means that

A. the animal's body temperature remains cold even in hot climates.
B. the animal can only exist on cold climates.
C. the animal cannot survive unless the temperature outside is higher than its body temperatures.
D. the animal's body temperature adjusts to that of its surroundings.

423

Adaptations possessed by rock platform organisms include those for:

1. holding on.
2. preventing drying out.
3. feeding by filtering water.
4. breathing underwater.

The blue periwinkle, Melaraphe, is found on the upper areas of rock platforms. It is exposed for much of the time and may suffer buffeting by waves.

Of the adaptations mentioned above you would expect Melaraphe to possess

A. 1 and 2.
B. 1 and 3.
C. 2 and 4.
D. 3 and 4.

A.2

424

In the October issue of National Geographic, 1975, there is an article on Desert Potholes and the organisms found there. Even when the hole contains water, the amount, the temperature, and the chemistry may change radically in a matter of minutes. For those organisms in the potholes, you would expect their life cycle to

A. be very short.
B. take a period of weeks.
C. begin when the water evaporates.
D. be controlled by water temperature.

A.1

425

Organisms found in a paddock often tend to burrow under the leaf litter.

The most likely explanation which accounts for this burrowing behaviour is that

A. no food is available on the surface.
B. they cannot breathe on the surface.
C. the surface temperature is too cold.
D. light has a harmful effect on them.

D.2

426

Some animals, such as owls and possums, which are more active when there is little light have large eyes. Others, such as bats and moles, have small weak eyes. From this we can conclude that moles and bats

A. move with greater difficulty than owls and possums.
B. are more intelligent than owls and possums.
C. are carnivores.
D. use senses other than sight.

D.5 427

Most organisms need oxygen for survival. In which of the following environments would an animal be most likely to suffer from lack of oxygen?

A. A stagnant pool.
B. A free flowing stream.
C. An estuary.
D. A coral reef.

A5. 428

If an animal lived for several hours in a confined space, the air in the space would be expected to

A. increase in oxygen content and decrease in carbon dioxide content.
B. increase in carbon dioxide content and decrease in oxygen and water vapour.
C. increase in carbon dioxide, decrease in oxygen, and show no change in water vapour.
D. increase in carbon dioxide and water vapour and decrease in oxygen content.

D3. 429

Some types of fly have evolved an appearance very similar to that of a wasp. This is an advantage to the fly because

A. they can then mate with wasps.
B. the wasps will not catch and eat them.
C. other animals will think they are wasps.
D. it allows them to eat the same food as wasps.

C1. 430

Pollen shape and size can be as different as the flowers that produce it. Pollen may be carried by wind and also transported by insects. You would expect pollen that is carried by wind to be as

A. heavy as possible.
B. large as possible.
C. light as possible.
D. small as possible.

C.4 431

Pollen that is predominantly carried by insects would be carried more easily if the flower pollen were

A. heavy.
B. sticky.
C. very large.
D. smooth.

B.5 432

A biologist wished to determine the temperature which best suited the activity of a certain species of salt water shrimp.

He placed 50 shrimp in a glass container. The container was designed so that its temperature could be changed during the experiment.

He was able to compare the number of shrimp moving at different temperatures. His observations are shown in the table below.

Temperature of the water	19°C	20°C	21°C	22°C	23°C	24°C	25°C	26°C	27°C
Number of shrimps moving	31	32	35	41	45	48	40	25	20

These results suggest that the

A. shrimp are certain to be killed by the temperatures above 26°C.
B. activity of the shrimp increased continuously as the temperature was raised.
C. shrimp would be unable to survive in cold arctic waters.

D4 D. shrimp are most active at temperatures around 24°C. 433

In an experiment on animal responses a lizard was placed in a white box with a glass lid. The box was warmed by a light bulb at one end. The temperature near the bulb was 60°C and at the other end of the box it was 15°C. No matter where in the box the lizard was placed, it always moved to the centre.

What temperature conditions does the lizard seem to like best?

C3 A. 50°C. B. 42°C. C. 37°C D. 25°C 434

A teacher scattered 250 different coloured toothpicks over a section of a turfed school oval and then set his class 5 minutes to find them.
The results were as follows:

Colour of Toothpicks	Original Number	Number found
Red	50	49
Yellow	50	44
Blue	50	39
Green	50	26
Natural	50	41

The principle illustrated by this experiment is best used by

A. polar bears in the Arctic.
B. brightly coloured tropical fish.
C. seagulls hunting for food.
D. crocodiles lying on a river bank.

A.1

435

A *Hydra* is a small animal which is green because it has algae living inside it. The algae produce oxygen which the *Hydra* uses and the *Hydra* produces carbon dioxide which the algae use. The relationship between the algae and the *Hydra* can best be described as

A. parasitism.
B. mutualism.
C. saprophytism.
D. commensalism.

B.2

436

A small European animal called the weasel is normally a solitary predator. When food is short, however, they band together and hunt in packs of several hundred. This behaviour benefits the survival of the species by allowing them to

A. mate freely and prevent inbreeding.
B. eat each other and survive.
C. sleep safe from other animals.
D. hunt larger animals than usual.

D.3

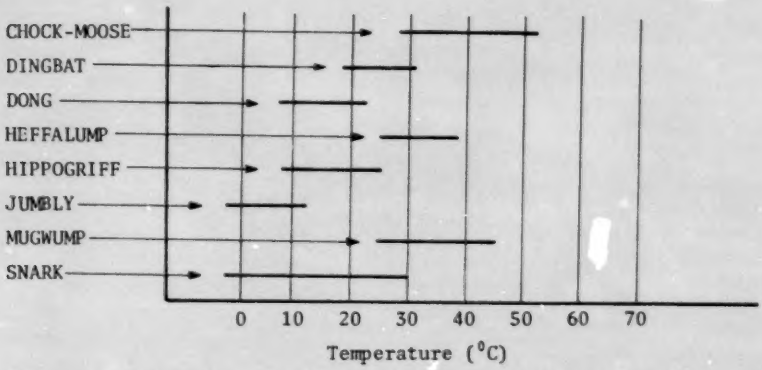
437

Of the following the animal least affected by changes in the temperature of its environment is a

A. rabbit.
B. blue-tongue lizard.
C. tree frog.
D. marine fish.

A1. 438

The next 3 questions refer to this information:



The favourable range of temperatures for some common animals.

On the basis of this information,

Which animal appears best adapted for changing temperatures?

A. Chock-moose
B. Heffalump
C. Mugwump
D. Snark

D5. 439

Which temperature range seems to be most suitable for life?

A. 0 - 10 C°
B. 10 - 20 C°
C. 20 - 30 C°
D. 30 - 40 C°

C4. 440

Which animal would be most likely to survive if a lake in a usually warm region became frozen for an extensive period of time?

A. Hippogriff
B. Jumbly
C. Mugwump
D. Snark

D3. 441

Specimens of three plants P, Q and R are grown under different conditions, giving the following results

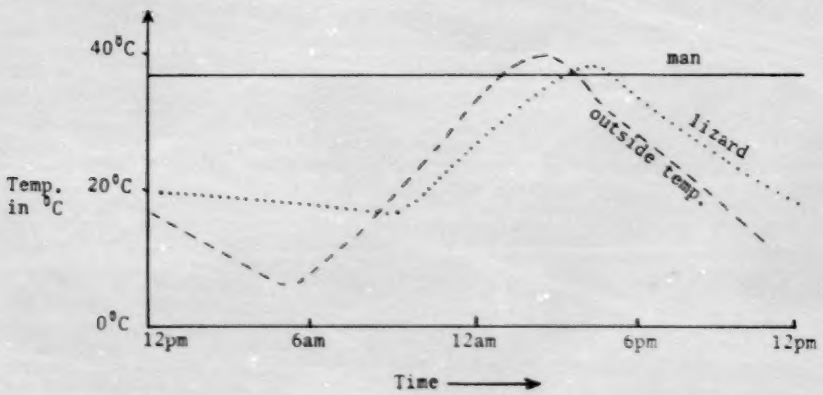
PLANT	OCCASIONAL WATERING	REGULAR WATERING	FREQUENT WATERING
P	WILTS	GROWS WELL	GROWS POORLY
Q	GROWS WELL	GROWS WELL	DIES
R	DIES	WILTS	GROWS WELL

From this we can conclude that the plants grow in the following environments

	P	Q	R
A.	DESERT	FOREST	RAINFOREST
B.	RAINFOREST	DESERT	FOREST
C.	FOREST	DESERT	RAINFOREST
C3 D.	RAINFOREST	FOREST	DESERT

442

The next question refers to the graph below which shows the variation in body temperature during a 24 hour period for both a man and a lizard.



Study of this graph would help us to understand

A. how mammals evolved from reptiles.
B. why mammals can live in areas too hot or cold for reptiles.
C. why many lizards live in deserts.
B2 D. how lizards can control their body temperature to suit the environment.

443

The next question refers to these drawings of seeds.

Which seed is best adapted for dispersal by the wind?

444

B5.

The gravity on the planet Xenos is equal to about twice earth's gravity, while the atmosphere is only half as dense.

Which of the birds below would be best suited for flight on Xenos

A. Large body, small wingspan.
B. Large body, large wingspan.
C. Small body, small wingspan.
D. Small body, large wingspan.

445

D3.

Here are some characteristics of plants:

1. widespread sub-surface root system.
2. large flat leaves.
3. thick woody stem.
4. large short-lived flower.

Which characteristics would be possessed by a plant which was adapted to desert life?

A. 1 and 2.
B. 2 and 3.
C. 3 and 4.
D. 4 and 1.

446

D1.

The tapeworm is a parasite living in the intestine of man and other animals. This organism does not have a mouth nor a gut. The most likely reason for this is that it

A. absorbs food from the host organism.
B. makes its own food by photosynthesis.
C. does not require food because it is a parasite.
D. lives off its own stored food reserves.

447

A3.

The seed shown on the right is best adapted for dispersal by

A. animals.
B. gravity.
C. water.
D. wind.

D4.

448

Some characteristics of four animals found on the planet Xenos are described below.

Animal	Number of limbs	Type of teeth	Type of feet	Eyesight
A	1	none	4 toes on foot	daytime excellent
B	2	molars and canines	2 claws each limb	day - poor night - good
C	3	canines and incisors	hoofs	very poor
D	4	molars	3 claws each limb	day - good night - poor

Which animal is most likely to be a predator?

B3.

449

A palaeontologist finds a fossil skeleton with the following features:

1. well-developed incisors and molars but no canines.
2. elongated leg and foot bones with two toes on each foot.

He could most correctly conclude that the animal was a

A. tree-climbing herbivore.
B. fast-running carnivore.
C. fast-running herbivore.
D. water dwelling herbivore.

C2.

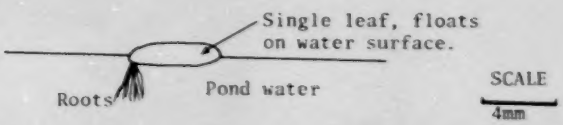
450

Which of the plants described below is able to survive in swampy conditions?

A. CACTUS is a succulent plant which stores moisture in its stem.
B. WATTLE has leaves which are reduced in size to prevent loss of too much water.
C. MULGA trees have a steep upward slope on their leaves and branches to collect water for the roots.
D. MANGROVES have "breathing roots" which stick up above the surface to obtain air.

D5. 45

Duckweed is a tiny plant which grows on the surface of freshwater ponds.



In an experiment, eight healthy duckweed plants were placed on the water surface of a normal-sized bucket filled with **fresh** water from a pond. The bucket was then placed in a room. After ten days had passed all plants were found to be dead. Of the following, the <u>most probable</u> cause of death would be

A. lack of carbon dioxide.
B. not enough room to grow.
C. the action of decomposer organisms.
D. insufficient light.

D3. 452

After rain falls in the desert, plant growth is very rapid. The plants grow quickly and complete their life cycle in a few weeks or sometimes only a few days.
This short life ensures

A. food for animals of the desert.
B. a minimum usage of water.
C. reproduction of the plants.
D. only shallow root growth.

C2. 453

EVOLUTION

The theory of evolution suggests that

A. mammals developed from amphibians, and birds developed from reptiles.
B. birds and mammals both developed from reptiles.
C. birds developed from reptiles and mammals from apes.
B1 D. birds and mammals are not closely related to each other. 454

Regions of the world are inhabited by large groups of plants and animals which are not found in other regions. How can this be so, if organisms have evolved from common ancestors?

A. Only plants and animals of the same species can interbreed.
B. Geographic isolation has resulted in divergent evolution.
C. Different climates in various places result in different organisms living there.
B1 D. The organisms living in a particular place depend on the type of food available. 455

A warm broth left standing in the air grows micro-organisms very quickly but a sterile broth (boiled for 20 minutes) sealed from the atmosphere does not produce any micro-organisms. This famous experiment destroyed the concept of

A. artificial insemination.
B. artificial sterilisation.
C. spontaneous generation.
C2 D. symbiotic specialisation. 456

The origin of new species is promoted by

A. crowding. C. population of a large size.
B3 B. geographical isolation. D. underpopulation. 457

This question refers to the newspaper report below.

HUGE SKULLS

At least 40 skeletons of a very early type of aboriginal have been discovered in northern Victoria.

Scientists say the find is one of the most important of its kind in the world.

They say it indicates that two different types of aboriginals lived on the Australian continent at the same time, about 20,000 years ago.

One type of aboriginal, physically as modern as the present day aboriginal, is known to have inhabited Australia 25,000 years ago.

But the recent find is of a type with physical characteristics not seen in the modern aboriginal.

The jaws of some of the skulls are as big as any found in the world.

One massive jaw is about the same size as the Heidelberg Jaw, generally accepted previously by anthropologists as the biggest in existence.

Several other jaws found at the site, about 200 miles north of Melbourne, are only slightly smaller than the Heidelberg Jaw.

The Heidelberg Man, discovered in Germany in 1907, is known to have lived between 300,000 and 400,000 years ago.

The skulls also show some resemblance to Java Man *(Homo Erectus)* who lived on earth about 500,000 years ago.

The skulls referred to in the news report establish the following fact

A. aborigines have occupied Australia for 300,000 to 400,000 years.
B. the skulls provide evidence for the missing link.
C. Java Man migrated to Australia about 500,000 years ago.
D. two types of aborigines occupied Australia about 20,000 years ago.

A teacher tells his class that the theory of evolution states "man and apes had a common ancestor". This statement is

A. a proven fact because scientists have produced men from apes in laboratories.
B. impossible because apes have longer arms, compared to their body length, than man.
C. a working scientific hypothesis because it fits many known facts.
D. evidence that the teacher does not understand evolution since it is known that man evolved from apes.

C.5 45

The next three questions refer to the information below.

In 1954, two scientists, Urey and Miller, conducted an experiment in which they placed a mixture of methane, ammonia, hydrogen, and water vapour in a flask.
Then they sparked the mixture for several days using high voltage electricity.

The hypothesis they were testing was most probably

A. living material can be derived from non-living chemicals.
B. the source of energy for the creation of life was electricity.
C. proteins are composed of a mixture of various chemicals.
A1 D. evolution of life began on earth, rather than from space. 46

As a result of this experiment, Urey and Miller succeeded in forming a(n)

A. alcohol. C. D.N.A.
B2 B. amino acid. D. protein. 46

Why did Urey and Miller choose this particular combination of chemicals? Because they

A. are easily and readily available in the laboratory.
B. combine with one another releasing energy.
C. are present in the atmosphere in measurable quantities.
D2 D. were thought to be present in the Earth's primitive atmosphere. 46

From the modern theory of evolution, it is most likely that man has descended from

A. the chimpanzee. C. the gorilla.
D2 B. the gibbon. D. none of these. 46

The next two questions refer to the following information table.

GROUP	1	2	3	4	5
Appearance of skin	covered with feathers	covered with hair or fur	dry and scaly	wet and naked	scaly
Usual environment	land	land	land	land and water	water
Organ used for breathing	lungs			gills for larvae - lungs for adults	gills
Usual method of reproduction	females lay hard-shelled eggs	females bear live young	females lay soft-shelled eggs	females lay fragile eggs with no shells	
	eggs are fertilized inside females before laying			eggs are fertilized in water after laying	
Care of young	young are fed until they can fly	young are suckled	young find their own food		
Adaptations for movement	limbs evolved from fins forelimbs of birds modified for flight				fins for swimming

The most accepted order of evolution of the animals grouped above is

A. 1,2,3,4,5.
D2 B. 2,3,5,4,1.
C. 3,2,1,5,4.
D. 5,4,3,1,2.

464

Which statement concerning the evolution of the groups of animals described in the table above is most probably correct?

A. Group 1 evolved before 2, but after 4.
B. Group 2 evolved before 1, but after 5.
C. Group 4 evolved before 5, but after 3.
A2 D. Group 5 evolved before 4, but after 3.

465

Many different theories have been put forward concerning the evolution of man and several are still accepted. The main reason why no single theory has been accepted by everybody is that

A. all scientists prefer their own ideas to those of others.
B. man actually evolved in many different ways.
C. the evidence is limited and may be interpreted in different ways.
D. the ideas of many scientists are now out of date.

C.3

466

It was reported in the Sydney Morning Herald on Wednesday, November 20th, 1974, that students had unearthed the bones of a whale in a swamp in South Australia.

This find would give evidence for the statement that

A. the whales originally lived in swamps.
B. the area was once part of the sea.
C. whale bones make good fossils.
D. the bones had been transported inland by the aborigines.

B5. 467

Fossils show that cockroaches have hardly changed at all during the past 250 million years. The statement which best explains this piece of evidence is that

A. the theory of evolution does not apply to insects.
B. cockroaches are so dirty they have no natural predators.
C. cockroaches are very well adapted.
D. cockroach chromosomes are so small that gene mutation cannot occur.

C4. 468

Amphibians were the major form of land dwelling vertebrate many millions of years ago. Today there are only a few remaining species. Those that have survived have done so because they

A. are poisonous and so are not eaten by other animals.
B. are well suited to the areas in which they live.
C. caused warts on people or animals who touched them.
D. are large and so are not often eaten by other animals.

B5. 469

A scientist discovered a rock containing a fossil fish at least 200 million years old. This is important because the discovery

A. increases our knowledge of geological history.
B. shows that the rock is older than the fossil fish.
C. shows that fish first appeared on earth 200 million years ago.
D. increases our knowledge of other fossils.

A3. 470

This question refers to the following passage.

"The giraffe, [illegible] its lofty stature, much elongated neck, forelegs, head [illegible] tongue, has a whole frame beautifully adapted for b[illegible]g on the higher branches of trees. It can thus obtain [illegible]d beyond the reach of other hoofed animals inhabiting the same country; and this must be a great advantage to it during droughts. The Niata cattle in South America show us how a small difference in structure may make, during such periods, a great difference in preserving an animal's life. These cattle can browse as well as others on grass, but from the projection of the lower jaw they cannot, during the often recurrent droughts, browse on the twigs of trees, reeds etc., to which food the common cattle and horses are then driven; so that at these times the Niatas perish if not fed by their owners."

From: *"The Origin of Species by means of Natural Selection."*

Charles Darwin

According to Darwin, when food is plentiful the possession of a long neck is

A. an advantage.
B. a disadvantage.
C. a nuisance.
D. of no special advantage.

D3. 471

The theory of continental drift says that today's continents were once joined into one or two great land masses. These great land masses started to break up 200 million years ago.

Which discovery below would be evidence for the theory of continental drift?

A. A red kangaroo and a koala were found in a South African zoo.
B. The fossil remains of a 250 million year old plant were found in Australia and India.
C. The skeleton of an eighteen year old female Aborigine was found in a South African cemetery.
D. Modern man evolved from *Homo erectus* two million years ago in Africa.

B4. 472

Linnaeus, an early Biologist, believed that all species of animals were created at about the same time.
Which observation opposes his theory?

A. Different sorts of animals live in different geographic regions in the world.
B. A study of the embryo of many animals shows distinct similarities in otherwise different groups.
C. There are more animals alive today than there have been in the past.
D3 D. Many animal species don't appear in the fossil record until quite recently. 473

Which of the following statements is inconsistent with modern evolutionary theory?

A. Variation in a population is caused by organisms developing characteristics as required.
B. Variants within a population compete with the rest of the population to survive.
C. Variation within a population may result from mutations.
A1 D. Successful mutants may pass their characteristics on to the next generation. 474

The theory that living organisms acquire useful characteristics to allow their survival and that these characteristics are passed on to the next generation, was first proposed by

A. Charles Darwin. C. Gregor Mendel.
B1 B. Jean Lamarck. D. Louis Pasteur. 475

The best evidence for the evolution of mammals from reptiles is that

A. both classes occur as fossils in rocks of the same age.
B. both classes have pentadactyl limbs.
C. there are fossil records of mammal-like reptiles.
C1 D. their style of reproduction is very similar in some cases. 476

Some people expect that man of the 21st Century will have developed much quicker reaction times than present day man because of the need for this ability in the driving of fast cars and aeroplanes. This belief supports the theory proposed by

A. Buffon. C. Lamarck.
C1 B. Darwin. D. the Modernists. 477

Part of Lamarck's theory of evolution was that "modifications acquired by animals were inherited by their offspring". Which observation opposes this theory?

A. Mice who have had their tails cut off have normal-tailed offspring.
B. Dark haired parents are likely to have dark-haired offspring.
C. A cross between black rats and white rats often results in black and white offspring.
A3 D. A tall man having a tall child from a short woman. 478

Land plants must have evolved before land animals could evolve because plants

A. were needed to provide oxygen for the animals.
B. are hardier and live longer than animals.
C. have much simpler organs than animals.
D2 D. were needed to provide food for the animals. 479

D. West, Government Printer, New South Wales – 1981